THE
DIARY COMPANION;

BEING A

SUPPLEMENT

TO THE

LADIES' DIARY,

FOR THE YEAR 1794.

Containing Anfwers to the laft Year's ENIGMAS, REBUSES, CHARADES, QUERIES, and QUES-TIONS; both in the DIARY and SUPPLEMENT.

With fome New ENIGMAS, REBUSES, CHARADES, QUERIES, and QUESTIONS, propofed to be anfwered next Year.

Alfo, CALCULATIONS of the ECLIPSES; and other New Difcoveries in the Heavens.

By the DIARY AUTHOR.

Printed for G. G. and J. ROBINSON, Pater-nofter-row, 1793.

[PRICE EIGHT-PENCE, STITCHED.]

SUPPLEMENT
TO THE
LADIES' DIARY,
FOR THE YEAR 1794.

ANSWERS TO THE ENIGMAS.

1. *Diary Enigmas.*

1 Echo,
2 Enigma,
3 Coffin,
4 Pump,
5 Hat,
6 Noon,
7 Shuttle,
8 Ring,
9 Merry Andrew,
10 Old Maid.
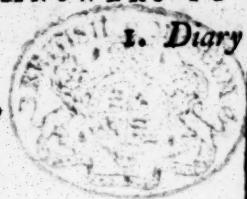
2. *The Supplement Enigmas.*

1 King at Chess,
2 Oak,
3 Candle,
4 Slate Pencil,
5 Murder,
6 Genius,
7 Hand,
8 Theatre.

Other Answers to the Diary Prize Enigma, besides those inserted in the Diary, are as below.

8. *By Mr.* John Bayley, Middleton, Yorkshire.

Indeed Madam Di, it cannot be said,
Tho' your worn out to 90, that you're an OLD MAID,
As a * Consort you got, not many years since,
Endu'd, like yourself, with deep learning and sense.
May you go hand-in-hand, and ever agree,
Is the wish of your most humble servant, *J. B.*
* *Companion,* or *Supplement.*

Otherwise, by the same Gentleman.

With attention and care the prize riddle I read,
And at last to my mind occur'd an OLD MAID.
But as things of this sort admit of a query,
And our Sages all hold, est humanum errare,
I own I'm a little embarrass'd with doubt,
And hope you'll excuse me, good Sir, if I'm out.

9. *Address to Cleora, by Mr. Tho. Browne, of Yedingham.*

Has not Cleora lavish nature given
Those charms that captivate and fix mankind
(The choicest blessings of indulgent heaven),
A faultless form and sentiments refin'd.

Beauty's moſt blooming roſes deck your cheek,
Not Paphian Venus can more graceful move,
Soft from your eyes the modeſt virtues ſpeak,
And all Cleora breathes delight and love.

Say why, adorn'd with all thoſe winning charms,
Theſe ſhining powers to raviſh and delight,
You fly diſdainful from your Damon's arms,
His love reject and all his profers ſlight?

Ah think, while youth and beauty's charms remain,
Love's pleaſing empire paſt will ne'er return!
When age ſlow-creeping ſhrivels every vein,
With hopeleſs grief you may neglected mourn!

The gay coquet, the artful prude diſguis'd,
The ſubtle jilt ſhall triumph then no more,
When wrinkles ſteal their charms, alike deſpis'd,
They ſigh unheeded, and unheard deplore.

10. Eliza's Addreſs to the Diarian Bachelors.

My fortune's a thouſand, at leaſt, I declare;
When my glaſs I conſult too I think myſelf fair.
In both mental and corporal charms I abound;
And, if all think as I do, but few can be found
So accompliſh'd as I am.   Who e'er doth incline
His addreſſes to pay, let me know by a line,
Next year in the Diary.—Perhaps I may write,
And well it is known how billet-doux I endite.
I'm a vot'ry of Hymen's.—O could I but find
A man with a fortune and parts to my mind!
Many offers I've had;—but none ſuits, and 'tis ſaid,
That Eliza muſt 'bate, or ſhe'll die an OLD MAID:
But I think were I known, as my worth ought to be,
They'd all be miſtaken; and that they ſhould ſee.

11. Addreſs to Miſs A. L. near Downham, by Hilarius.

Gently to ſoothe to reſt
The ſad and troubled breaſt,
Is yours, and yours alone, ye lovely fair:
One look, one beauteous ſmile,
Can ſorrow's pains beguile,
And ſoothe the rugged brow of fell deſpair.

As late 'twas mine to rove,
Slow ſeem'd the wheels to move,
That bore the lonely traveller on his way;
Tho', in gay livery hung,
The fields rejoic'd and ſung,
Chearleſs I view'd the treaſures they diſplay.

A 2

But to my ravifh'd fight
When fate, to give delight,
Fair Anna, lovely ftranger, kindly brought ;
Woe could no longer find
A feat within that mind,
Where one bright object occupied each thought.

Then fwift the hours flew,
To haften my adieu
To thee, dear *Maid*, of pureft mind poffeft—
Would, to my fervent prayer,
Heaven grant that one fo fair
May with her converfe make life's journey bleft.

*Other Anfwers to the Diary Enigmas, befide thofe inferted
in the Diary, are as follow.*

12. *The Fickle Lovers* ; *by Mr. David Robarts, of St.
Columb.*

In a pleafant winding valley
Stands a fhepherd's habitation,
Where refided blooming Sally,
Never prone to diffipation.

She was woo'd by young Leander,
When fhe led her flocks along;
Where the bubbling brooks meander,
He would greet her with a fong.

When the youth declar'd his paffion,
With the moft benign refpect ;
Tutor'd well in ruftic fafhion ;
Could the nymph his fuit reject ?

Often in a fhady bower,
Wove to fhield the Noon-tide heat,   6
They would talk of love's fweet power,
And their mutual loves repeat.

A Ring was purchas'd for the wedding,   8
And a Hat with ribbands grac'd ;   5
A houfe well furnifh'd *Bed* and bedding   3
All in ample order plac'd.——

How fhall I difclofe the Riddle,   2
Each as fickle as the wind ;
Ere the prieft began to meddle,
Both the parties chang'd their mind.

Andrew now has married Sally,   9
He the Shuttle handles well ;   7
And Leander's quit the valley,
On yon fertile plain to dwell.

Both contented in their ftation,
The PUMP-room's queft they envy not ; 4
While OLD-MAIDS in dire vexation, 10
To ECHOing winds lament their lot. 1

13. *The Unfortunate Lovers ; by Mifs M. S.*

Near to yon long deferted cell
A blooming youth there once did dwell ;
A beauteous MAIDEN was his love, 10
Who dwelt within that myrtle grove ;
At NOON they to the PUMP would walk, 6, 4
Of tender friendfhip all their talk ;
With flow'rets fweet he'd deck her HAT, 5
While on a violet bank they fat.
No MERRY ANDREW's tricks he fung, 9
Nor fwift like SHUTTLE went his tongue; 7
To wedlock ftruck the tuneful ftring,
To thofe foft joys feal'd by the RING. 8
The hills re-ECHO the fweet ftrain, ?
The fportful lambs frifk o'er the plain——
But the RIDDLE of their fate was hid : } 2
Now all the joys of life were fled,
And Silvia in her COFFIN laid. 3
Long William mourn'd his lovely bride ;
Ah ! where could he his forrow hide ?
He join'd in death his gentle fair ;
Sure heaven receiv'd the faithful pair.

14. *Invocation to Mirth ; by Mr. Tho. Smart.*

Hence far away be fell defpair,
With horror dire, and gloomy care,
  No more my mind affault ;
To where the taper dimly burns,
Where founds from COFFINS and from urns 3
  Re-ECHO throug the vault. 1

But " come thou rofy dimpled boy,"
Parent of eafe, and child of joy,
  With all thy jocund train ;
Bright as the NOON, when nature gay 6
Clothes Flora in her rich array,
  Refrefh'd by April rain.

Whether in ENIGMAtic guife, 2
Thou pofe the train of great and wife,
  With hidden meaning big ;
Or where the MERRY-ANDREW droll 9
Cracks jokes on Will and John and Moll,
  And fhakes his HAT and wig. 5

Or if in pleafure's flow'ry RING   8
The fancy of the moment *Spring*,   4
    With laughter fhakes the floor;
No thoughts of wealth or power moleft,
Enjoying thee, completely bleft,
    Nor ftirs a wifh for more,

Come thou, and e'er with me refide,
Then I'll the *caufe of ills* deride,   10
    My conftant welcome gueft ;
Time, like a weaver's SHUTTLE flies,   7
Infpir'd by thee, may I be wife,
    Then fink to endlefs reft.

15. *Charms of Eaton* ; *by Mr. Wm. Wardley.*
   Yes, fraught with charms as fair as moft,
   Eatonia's plains can profpects boaft :
   Diverfify'd with floping hills,
   With flow'ry vales and purling rills,
   With upland lawns and folemn groves,
   Where matin fongfters chant their loves ;
   And if antiquities delight,
   Here are to gratify the fight;
   Here mould'ring mounds may charm awhile,
   Yonder a venerable pile,
   Where veftal nuns of erft immur'd,
   In privacy their God ador'd,
   That bofom cannot fail to warm,
   Which ivy-crefted remnants charm.—
   Do any contemplation love ?
   Let them by winding Anker rove,
   Such fcenes fhall meet the wan'dring fight,
   As bring half Eden's joys to light—
   From diftant fites borne on the gales,
   The MIMIC ECHO chears the vales,   9, 1
   Sporting with th' clofe of ev'ry ftrain,
   ENIGMA to th' unweeting fwain.—   2

    It's true, you fhall not here remark
   A concourfe, fuch as haunt the park,
   Of belles precife in rich brocades.
   Of powder'd fops and fwaggRING blades—   8

    Perchance, in ruftic weeds array'd,
   Some fhepherd and his fav'rite maid,
   As wrapt in courtfhip's joys they rove,
   Or by the rill, or through the grove,
   May meet your ken, but ne'er the flaunt
   Of envious fharp-nos'd MAIDEN-AUNT;   1

Such as in PUMP-rooms, or at tea,   4
Whifper our dear good names away.——
   O thou that doft fate's SHUTTLE ply,   7
Sage Lachefis! ordain tHAT I   5
May (though in NOON of life) refide,   6
Stranger to worldly cares and pride,
'Midft thefe fair fcenes of peace, unknown
Save to fome chofen friends alone;
(Oh hear me, and but grant me thefe);
Till bent with age by flow degrees
My vigor wanes, and I become
Fit tenant of a little DOME,   3
Such as muft foon or late immure
The wealthy lord, or peafant poor.

16. *On the Enigmas*; *by Mifs A. Wood, of Liverpool.*
No ECHO ever half fo pleas'd my ear,   1
As hearing your ENIGMAS read this year.   2
The COFFIN is with artful fancy wrought;   3
The PUMP is with poetic beauty fraught;   4
The HAT is made no common head to fit;   5
The NOON, tho' dark, is full of lively wit;   6
The SHUTTLE's made from hand to hand to fly;   7
The RING I think a very pleafing toy!   8
The MERRY-ANDREW is a funny blade;   9
And clofe behind him ftands a choice OLD-MAID.   10

ANSWERS *to the* PRIZE ENIGMA *in the laft* SUPPLEMENT.
1. *On Winter*; *by Mr. T. Browne.*
When dreary winter clothes the fields in white,
And mourning nature's dead to love and joy;
When Phœbus fcarce vouchfafes a faint dim light,
And darts his rays obliquely thro' the fky;
Ah, then no fcenes of pleafure meet the view!
No verdant meads can tempt the fair to ftray,
Till genial fpring the fmiling fcenes renew,
And nature's renovated charms difplay.
Yet this dull feafon has refin'd delights,
But chiefly fought o'er all appears the STAGE,
Where Melpomene's plaintive theme invites,
Or Thalia holds a mirror to the age.

2. *The fame anfwered by Fidelio.*
Could I but bring the prize to light,
Ten Supplements, a pleafing fight!
   Perhaps would fall to me;
O then Apollo condefcend
To help a fupplicating friend;
   The praife I'll give to thee.

Where can it be the beauteous fair,
To raife their fpirits oft repair,
     When forrowful and fad ?
As thus I fought his godfhip's aid,
He heard my prayer and foftly faid,
     The Theatre my lad.

3. *By Mr. John Fildes, Schoolmaster, Liverpool.*

Thy ftrains, oh Vertigo, I much admire ;
Thy lively fancy, and poetic fire ;
On Dia's Stage long may thy verfes fhine,
For wit and eafe and manly verfe are thine.

4. *The fame, by Mifs in 'er Teens.*

Dear Mr. Author infert my fond rhime ;
I boaft not of merit, nor yet of good time ;
But a fmall little niche in Diaria's page
Will pleafe me far better than ball or the Stage.
Indulge me for once then, I ufe my beft means,
And fay you was courted by, Mifs in 'er Teens.

5. *Addrefs to Mifs* ———; *by Mr. H. A. Thawtemfon.*

With youthful hand I ftring the lyre,
And trembling touch the facred lay ;
To thee my wifhful thoughts afpire,
At dawn, deep noon, and clofe of day.

I feek in vain, both day and night,
To free my mind from anxious care ;
The Theatre yields no delight,
Unlefs my dear Formofea's there.

6. *By Mr. John Tindale.*

Go on, fweet bard, the theme purfue,
To grace fair Dia's page,
She doth thy lays with rapture view,
And fondly hails the Stage.

7. *By Mr. J. Weftcott, Schoolmaster, of Clift Honiton,*
near Exeter, Devon.

Let the gay and the great, let the love-fmitten fair,
To the Stage's amufements each evening repair ;
With far greater pleafure, with much more delight,
I'll teach my young pupils to read and to write ;
Then to witnefs the progrefs the little ones make,
Will exceed all the joys of the Play or the wake.

Various other ingenious anfwers were given by James Ayres, Job Ayres, Geo. Biggs, Wm. Bofwell, Betty Boys, John Burrow, B. Cleypole, Rob. Gundall jun. G. Davies, Rd. Dening, Nanny Dent, Tho. Elmer, J. Ewbank, John Fildes, Mrs. Furnafs, Rob. Hendy jun Tho. Hornby, Alethea Wilhelmina Maken, James Mulcafter jun. Philip Norris, John Nuttall, Oedipus, John Rimmer, David Robarts, Alex. Rowe, Mifs A. T., Rob. Wilkinfon.

1. *The Enigmas anſwered by Mr. Tho. Browne.*

By ſilent night's pale gleaming lamp to rove,
Oppreſs'd by grief and deep corroding care,
The ſlighted virgin ſeeks the *gloomy grove*,   2
And there in ſighs ſhe vents her lone deſpair.
The dark aſſaſſin lurking lies unſeen,
Where ſable ſhades inveſt his ſable head,
And marks the victim of reſentment keen,
While night's dun veil conceals the *horrid deed*.   5
The flaunting actor traverſes the STAGE,   8
The magic PENCIL ſtrikes the wond'ring ſight,   4
While ſome at *Cheſs*, or cards, or dice engage,   1
And nimble HANDS deceive th' unſkill'd by ſlight;   7
But my attention other thoughts engage,
And while my *taper* ſheds a glimm'ring light,   3
My GENIUS I indulge in Dia's page,   6
T' explore what's hidden and conceal'd from ſight;
Where Harpur ſhines conſpicuous in the throng,
A Jones, a Browne, and Richardſon appear,
With all the flowing elegance of ſong,
To treat th' attentive world from year to year.
The poet's meed tho' I ſhould never gain,
Or place the laurel wreath upon my brow,
Let me be foremoſt of that humble train,
Worth to admire where admiration's due.

2. *The Negro*; *by Mr. J. D. of London.*

Ye lovely fair, of ſenſe refin'd,
Whom GENIUS' purer *beams* illume,   6, 3
Whoſe labours ſtill delight the mind,
Oft as the PENCIL you aſſume.   4

Whoſe wiſhes, whoſe exertions tend
To ſuccour all 'gainſt whom prevail
The arrows of affliction, lend
Attention to a mournful tale.

From tawny Afric's golden ſtrands,
A hapleſs Negro youth was borne;
By barb'rous and oppreſſive HANDS,   7
From friends, from relatives was torne.

To ignominious bonds conſign'd,
Reflection oft his cheek bedew'd;
Thoſe *Scenes* where love and joy combin'd,   8
Exchang'd for endleſs ſervitude.

Condemn'd the ſcourge to undergo,
To groan beneath the galling YOKE;   2
To brave the ſun's meridian glow,
Oft did he death's embrace invoke.

One morn, unable to fulfil
His tafk, by ceafelefs toil fubdu'd,
Prompt at his ruthlefs tyrant's will;
Fell whips and fcorpions enfu'd.

In vain they ply'd the knotted fcourge,
In vain thefe plaintive accents rofe,
" If more thefe *killing* pangs you urge,   5
This day, this hour fhall end my woes."

Still, ftill commanded to be whipt,
Defpair and tumult fill'd his breaft;
Sudden he in a caldron leapt,
And died thefe *flagrant* wrongs t'atteft.   1

3. *By the Rev. Mr. Ewbank, of Thornton Steward.*
I neither play at draughts nor *Chefs*;   1
But I'll th' Enigmas try to guefs;
'Tis pleafing, on a winter's night,
To read them o'er by CANDLE light.   3
Sometimes beneath a *tree* I read;   2
Sometimes I crofs the verdant mead,
With angle in my HAND to fifh;   7
But rarely can I *kill* a difh.   5
My GENIUS is not bent this way,   6
My bufinefs chiefly is to pray;
And *trace* the way for ruftic fwain   4
To ferve his God, and heaven attain:
But good advice too many feem
To flight, and act as in a dream;
Yet, ere the STAGE of life men quit,   8
I wifh all may for death be fit.

4. *Ode to Spring; by Fidelio, of Bath.*
Phœbus, refplendent *lamp* of day,   3
    Revolving in his fiery fphere,
Again makes all creation gay,
    And animates the rifing year:
Now wonted beauties o'er the land,
    In richeft luxury abound,
For nature with her liberal HAND,   7
Unlocks her ample ftores, and fcatters blef*sings* round.   1

Reviv'd by fol's prolific ray,
    Fair Flora's ever pleafing *train*,   4
Again their varied hues dif*play*,   8
    And decorate the wide campaign:
The *trees* their foliage reaffume,   2
    Their liveries the hills and dales,
The gay parterre its wonted bloom,
And aromatic fragrance fills the grateful gales.

Hark! what enchanting muſic floats
 On zephyr's wings, from yonder grove,
Where feather'd *warblers* ſwell their throats,   5
 And tune their vocal powers to love;
E'en Philomel, ſweet bird! again
 To liſt'ning Luna's lucid face,
Renews her elevated ſtrain,
That charms the prompted ear and ſoothes the mind to peace.

O had I GENIUS to purſue   6
 The pleaſing theme, in lofty lays,
To render what's ſo juſtly due
 To nature—fervent thanks and praiſe:
But I will now forſake the muſe,
 And prudently the taſk give o'er,
To ſuch as Woolſton, Jones, or Hughs,
Whoſe animated ſtrains are fraught with learned lore.

5. *On Night; by Mr. John Rimmer, of Liverpool.*
See the refulgent lord of day,
Whipping his fiery ſteeds away;
And night her ſable curtain draws,
And man and beaſt now ſeek repoſe.
See! underneath yon ſhady *tree*,   2
Thro' whoſe thick branches none can ſee,
The MURD'RING villain lifts his HAND, 5, 7
And bids the trav'ler ſilent ſtand;
Who from the leaſt reſiſtive ſtrife,
Is forc'd to quit this STAGE of life.   8
See, yon *taper's* ſcatter'd beams,   3
But faintly aid the GENIUS' ſchemes; 6
Whoſe philoſophic thoughts delight
In the calm ſolitude of night:
Whilſt he with judgment PENCILS truth, 4
And points the way to heedleſs youth;
Shews the deceptive arts of vice,
Whoſe pompous *banners* man entice: 1
Then he the path to bliſs pourtrays,
In comic and in ſolemn lays.

6. *The ſame, by Mr. E. Robertſon, of Cheſter-le-Street.*
Happy the man who free from vice,
Whom neither *Cheſs* nor cards nor dice   1
 From virtue's paths allure;
As *trees* outſtand the ſtormy blaſt,   2
While terra firma binds them faſt;
 So ſtands his ſoul ſecure.

May ev'ry pure and virtuous *ſage*,   6
Shine in this dark degen'rate age,

As te ers in the night;   3
No idle *toys* his HAND employ   4, 7
No MURD'RING gun nor PLAY-HOUSE joy;   5, 8
    These give him no delight.

With joy to trace Jehova's ways,
Admire his works and sing his praise,
    My chief employ be this;
Fair nature's book unceasing read,
My soul with heav'nly cates I'll feed,
    And claim immortal bliss.

7. An Address to Mrs. Richardson, by Vertigo.

Believe me, madam, I should have essay'd
To form a garland for th' accomplish'd maid,
The fair Miss Harpur, soft endearing name,
Your fairest rival in the list of fame :—
Lovely ,like you, when with the force of charms,
You drew a panting lover to your arms,
And seal'd his offers with a gen'rous kiss,
The sweet, the rapt'rous seal of future bliss ;
Lovely, like you, when, with the pow'rs of song,
You drew our tend'rest thoughts with you along.
By Venus' doves, O madam, here I swear,
By her soft HAND, her eyes, and flowing hair ;   7
By Cupid's bow-string, his malicious dart,
That sticks with icy coldness at my heart,
I would have sought, with all my little pow'rs,
To cull the fairest, most delicious flow'rs
From my parterre, to grace her lovely head—
Soft as the vale Arabian sweets o'erspread ;
But from neglect these flow'rs have pin'd and died,
And weeds of ev'ry class their place supply'd ;
Where once the lily smil'd with modest grace,
There creeping crow-foot gathers round the place ;
And where the pink and gay carnation bloom'd,
And with their blended sweets the air perfum'd,
There cold cicuta works its *deadly* way,   5
And nauseous fig-worts their rank leaves dis*play*;   3
And where the laurel, ever-honour'd *tree*,   2
Lov'd by Apollo and rever'd by me,
Wav'd to the winds its shining leaves of green,
There deadly night-shade all around is seen ;
Ah! should I wreath these weeds to give the fair,
Or with them shade one ringlet of her hair,
She would command me with forbidding eye
To give them to the dust, in dust to lie.

    Then, madam, since you can with ease impart,
The readiest way to gain a woman's heart,

Shew me the way, I'll not the path decline,
Till fair Louifa yields herfelf as mine;
I'll freely offer up my pray'rs, in turn,
That Hymen's *torch* for you may ever burn.   3
Perhaps, oh grief to think, advice is vain,
She fondly liftens to fome other fwain,
She fondly liftens, in her myrtle grove,
To the foft whifpers of propitious love;
Perhaps, e'en now, his PENCIL's rais'd to trace   4
Where rofes fade to lilies in her face,
Or elfe, O madnefs! he the effort tries
To catch the GENIUS beaming from her eyes: 5
If fo, O mufes, I forfake your bow'rs;
To wafte in filent fhades the penfive hours,
And with contention war no more will wage,
Nor mix with actors on life's bufy STAGE;   6
And thou, my harp, fweet foft'ner of my care,
Wont of my forrows to partake a fhare,
Yes thee, my harp, I'll hang on fome rude thorn,
And leave thee with the paffing winds to mourn.

8. *Rural Contentment; by Mr. Wm. Wardley, Mafter of*
the Academy, Fennel-Street, Loughborough.

Crowds for me have no delight,
Play fuch trifling joy imparts,   1
I've not learnt to name aright
'Th' terms of the time-killing arts.

Nor can I amufements find,
At THEATRES fuch as thofe,   2
Which the happiest of our kind,
The poor fimple ruftic knows.

Give me rather a retreat,
Some fair fylvan fcene remote,
Far from gilded pomp and ftate,
Far from fafhion's gay refort.

Where no noify care intrudes,
No unholy fights abound,
Where refponfive hills and woods,
No immoral lays refound.

O how happy is the fwain!
How defirable his lot!
Joy is his upon the plain;
Sweet contentment in his cot.

Soon as Phœbus 'gins to peep,
Ufh'ring in the dappled morn,
From the fold he leads his fheep
" To tafte the verdure of the lawn.

Seated in an OAKen bow'r,
While his lambkins fkip around,
On his pipe at noon-tide hour,
Sweetly playing he is found.   2

In the cooling eve he ftrays,
By fome murm'ring ftreamlet's fide,
Carroling the GENIUS' praife,   6
That does o'er the fcene prefide.

But when damps inveft the meads,
Guided by the *taper*'s ray,   3
Which from diftant cot proceeds,
Homeward he directs his way.

There, till ftated time of reft,
Chearful converfe wings his hours,
When by him his bed is prefs'd,
Sleep demands no opiate pow'rs.

MURDER that does towns annoy,   5
Foreign is to his eftate;
Peaceful, ftudious his employ,
With his PENCIL and his flate.   4

Calumny by courts carefs'd,
HAND-maid of fell envy near,   7
No harbour finds within his breaft;
No, the fhepherd is fincere.

*Other general and ingenious anfwers to the Supplement Enigmas were
alfo given by Meffieurs Aminicus, James Ayres, Job Ayres, Mifs Betty
Boys, John Burrows, Jos. Dawbney, Tho. Elmer, J. Fildes, J. Furnafs,
Tho. Hornby, M. Laidman, Alethea Wilhelmina Maken, Phil. Norris,
John Nuttall, Oedipus, Da. Robarts, Alex. Rowe, John Savage, Jos.
Scott, J. Stainmore, and Wm. Tarmior.*

ANSWERS *to the* REBUSES *and* CHARADES.

	In the Diary.		*In the Supplement.*
Rebufes.	*Charades.*	*Rebufes.*	*Charades.*
1 Wantage,	1 Orange,	1 Song,	1 Scabbard,
2 Woolfton,	2 Snowdrop,	2 Carr,	2 Larkfpur,
3 Fildes,	3 Schoolboy,	3 Landen,	3 Nutmeg,
4 Pitt.	4 Noonday.	4 Brown.	4 Signpoft.

The SUPPL. REBUSES *and* CHARADES ANSWERED.

1. *The Choice; by Mifs Betty Boys.*
If women could their hufbands choofe,
And wed to whom they pleafe,
No wealthy mifer, my fweet mufe,
Should give my fancy eafe.

No En*fign* pert, in tinfel drefs'd,
   With *fcabbard* by his fide,
Should fhare the fecrets of my breaft,
   Or claim me for his bride.

No, none but fome finging bard,
   Like *Landen, Carr*, or *Brown*,
Whofe piercing wit, for their reward,
   Has rais'd them to renown.

On *Nutmegs, Song*, or *Larkfpurs* write,
   And fuch as deck the vale;
To Lady Dia verfe indite,
   Poft-hafte from Stainton-vale.

2. *The fame anfwered by Fidelio.*

The fweets of *Song* delight the penfive mind;
Friend Robinfon's to fair Mifs *Carr* inclin'd;
The learned *Landen* gain'd an honour'd name,
Which ftands diftinguifh'd in the lift of fame;
Mifs *Brown* will Thawtemfon's fair maid expound,
A *Scabbard*'s with the hardy warrior found;
Larkfpurs adorn the flow'ry pride of fpring,
Nutmeg's a fpice which we from Ceylon bring;
A *Signpoft* indicates a place of reft,
Where wit and humour give good cheer a zeft.

3. *Addrefs of Philomel;* by Mrs. H.

Sweet plaintive bird of evening mild,
How foft thy notes to forrow's child,
   When footh'd he liftens to thy *Song:*
   Not *Carr* nor *Brown* can calm his grief,
   Nor *Sign* nor *Poft* can bring relief,
Like the foft warblings of thy filver tongue.

Thou courteft not the glorious fun,
Like the loud lark on pinions hung,
   Who foars like *Landen* to the fky;
   But lowly feeks the *Spicy* grove,
   There *fheath'd* in fhades thou chant'ft thy love,
Nor envy can thy gentle peace annoy.

4. *The fame, by Mifs Alethea Wilhelmina Maken, of Liverpool.*

Mifs *Brown* and Mifs *Carr* are your charmers fo fam'd,
And *Larkfpur* and *Nutmeg* your fweets I have nam'd:
Good cheer at the *Signpoft* to *Landen* is fhewn,
Where *Songs* and good liquor man's cares often drown:
The *Scabbard* alone is a token of peace,
Of concord and plenty, of pleafure and eafe;
This laft pleafing profpect prefents to my view,
A promife of friendfhip, both lafting and true.

5. *The same, by Mr. Philip Norris, of Liverpool.*

Near yonder *Signpost*, where the *Scabbard*'s hung,
   Refides Mifs *Brown*, as *Larkspur* fweet and fair :
The fam'd Mifs *Carr*, defcrib'd in *Landen*'s *Song*,
   As *Nutmeg* fweet with her has no compare.

This charming nymph, moft lovely and moft fair,
   Tho' beautiful, accomplifh'd is her mind ;
Which 'tis well known, when join'd with prudent care,
   Completes a beauty, as if thrice refin'd.

6. *Female Merit ; by Mr. Wm. Wardley.*

To *Landen* fome may turn their lays,
   A *Nutmeg* or a *Signpoft* fing,
A *Larkspur* fome may deign to praife
   A *Scabbard*'s fame may others fing.

Be mine the pleafing tafk to praife
   True female merit—whether found
In *Carr* or *Brown*, it claims my lays,
   And fhall be fung the valley round.

Howe'er exalted or deprefs'd,
   That merit ever is the fame,
Whether in royal Charlotte's breaft,
   Or cherifh'd by the fylvan dame.

Supremeft blefling heav'n beftows !
   That heav'n beneficent and kind !
And tell me is there ought that fhews
   Refplendent as the female mind ?

When cultur'd with a tender care,
   Its charms how permanently fweet !
United all perfection's there,
   There judgment found and foftnefs meet !

But O ! unequal to the tafk
   Am I, indeed it far tranfcends
My weak efforts, and feems to afk
   A *Song* like Lee's to fhew its charms,
      and tell its noble ends.

*Other ingenious anfwers to thefe Rebufes and Charades were given by
Meffieurs Job Ayres, T. Browne, Wm. Burdon, John Burrow, Rob.
Cundall jun. Jos. Dawbney, Mifs Nanny Dent, Tho. Elmer, Rev. J.
Ewbank, Tho. Hornby, John Nuttall, John Rimmer, Da. Robarts,
Alex. Rowe, John Savage, Jos. Scott, Wm. Tarmior, and J. Weftcott.*

ANSWERS *to the* DIARY QUERIES.

DI. QU. 1. *Anfwered by Mr. J. Burrow, of Bolton-Field.*
   This is after a very hot and fultry day ; for the heat of the
fun acting on the furface of the water, rarefies it, and caufes

it to evaporate in large quantities, as well as the moiſture of the ground; but as ſoon as the ſun is ſet and the air cooled, the evaporation being hindered from aſcending by the coldneſs of the air, the vapours become viſible, and appear like clouds or miſt.

I went, ſome years ago, about the firſt of Auguſt, to the banks of the river Eden, to make all the diſcovery I could of this appearance. It was a very hot and ſultry day, and continued warm till ſunſet. About ten minutes after this, I obſerved the miſt riſing in the fields a little below me, at which time there was no wind, but the air began to grow very cold. At firſt I could only perceive it in the furrows; it roſe about half a yard high, moved forward, and came all around me. I laid my head cloſe to the earth, and obſerved it riſing out of the ground on all ſides of me like ſteams out of a dunghill: next the earth it was light and thin, and I could ſee ſome few yards before me; but the upper ſide was groſs and thick like a white cloud. In a little time all the meadows were covered with miſt, when it had riſen about a yard, but was ſtill very denſe on the upper ſide, being confined by the atmoſphere above, which was now grown cold and moiſt, and puſhed up by the quantities which ſtill continued to aſcend. Sometimes it riſeth much higher, but this is when the air is warmer. I could not perceive the vapours to aſcend from the water at that time by reaſon of the large quantities on the land, which obſtructed my view; but at other times I have ſeen it riſe out of the water.

Hence it appears that it is the vapours which riſe out of the ground after ſunſet, and not thoſe which riſe in the day time, which are the cauſe of this appearance.

The ſame anſwered by Mr. Joſeph Dawbney.

Miſts or vapours conſiſt of aqueous or watery particles, ſeparated from the water or moiſt earth, by the action of the ſun's heat, by which they are ſo far rarefied and ſeparated from each other, as to become ſpecifically lighter than air, and conſequently riſe and float in it. But in the evening as the heat abates in our atmoſphere, the particles are condenſed, till they become ſomewhat heavier than air, when falling towards the earth they cauſe the miſts that appear hovering in thoſe places.

The ſame, by Mr. Henry Mellanby, of Stockton.

Air lying over rivers, marſhy ground, &c. after ſunſet growing cold, let its aqueous particles coaleſce into ſmall viſible particles, which form the miſts that are obſerved to riſe over ſuch places in ſummer evenings.

DI. QUERY 2. Anſwered by the Rev. Mr. Ewbank, of Thornton Steward, near Bedale, Yorkſhire.

Valentine was an ancient preſbiter of the church; he ſuffer-

ed martyrdom under Claudius at Rome. Being delivered into the cuftody of one Afterius, he wrought a miracle upon his daughter, whom, being blind, he reftored to fight, by which means he converted the whole family to chriftianity, who all of them afterwards fuffered for their religion. Valentine, after a year's imprifonment at Rome, was beheaded in the Flaminian-way about the year 271, and was enrolled among the martyrs of the church; his day being eftablifhed before the times of Gregory the Great. He was a man of moft admirable parts, and fo famous for his love and charity, that the cuftom of chuf-ing Valentines upon his feftival took its rife from thence.

The fame, by Mr. John Burrow, of Bolton-Field.

Valentine was an eloquent and learned Egyptian, who pro-feffed Plato's philofophy. He lived in the 3d century, and quitted his faith becaufe another was preferred before him to a bifhoprick. He made ufe of dreams of certain gods; and ob-ferving the birds to chufe their mates about a certain time, the 14th of February, he recommended it as a proper time, for young men and maids to chufe their lovers; from whence it became a cuftom, firft in Italy, and afterwards in other places, to fend compliments to one another on that day.

DI. QUERY 4. Anfwered by Mifs Nanny Dent.

For a young lady to encourage the addreffes of a fuitor the firft time, is manifeftly improper, becaufe it gives him an op-portunity of fuppofing that fhe poffeffes a partiality in his favor, and he will value himfelf the more in confequence of this idea, as may be feen perhaps in his future conduct. For this and feveral other reafons I could wifh every young lady not to ap-pear too forward in admitting the addreffes of a fuitor; for I am fully perfuaded that a ftrict referve at that critical moment is abfolutely neceffary.

The fame, by Mifs Nancy Mafon, of Clapham.

For a perfon of our fex to give much encouragement to a fuitor the firft time, in my opinion would be very imprudent if fhe be ever fo well acquainted with his character. For if fhe could wifh to have a farther connection with him, and he be a perfon not difagreeable to her for a hufband, if fhe be very kind and give him much encouragement, men in general are of fuch a ftrange difpofition, that it is not unlikely he will leave her, and never addrefs her more; but if fhe keep him at a diftance, I think he will even love her better for it; for people com-monly prize any thing that is attained with difficulty, more than what is eafily acquired.

The fame, by Mr. Geo. Gibbs, jun.

For a female to encourage the addreffes of a fuitor the firft time, appears both prudent and honeft: admitting the perfon is approved in her own mind, which feems implied in the

query : Honeſt, in not diſſembling the wiſhes of her mind ; and prudent in giving encouragement to one whom ſhe likes. No ſenſible man can ever diſlike a female who acts on theſe princi- ples ; on the contrary, it muſt impreſs his mind with every lively ſenſation of reſpect. Perhaps with a man of mean abili- ties it would operate differently ; he might ſay it was being too forward ; but prudence forbids to pleaſe one of that deſcription.

And thus, in like manner, our male contributors generally give their opinion in favour of the firſt and immediate encou- ragement.

The SUPPLEMENT QUERIES ANSWERED.

SUP. QU. 1. *Anſwered by Mr. John Dalton, of Kendal.*

The only true anſwer to this may be found in moſt books that treat of the regular winds. The unequal capacities of land and water for receiving heat, are undoubtedly the cauſes of theſe phenomena. Land receives more heat, or rather per- haps is heated to a greater degree, than water. Independent therefore of the general or trade winds, the winds ſhould blow *towards* the centre of the iſlands in the day and *from* the centre in the night ; conſequently on the eaſtern ſide of the iſlands, in the day, the winds occaſioned by this cauſe conſpire with the general eaſt wind, and they oppoſe it on the weſtern ſide, ſo that the velocity of the general wind will be increaſed in the one caſe, and diminiſhed in the other ; but in the night, the wind blowing from the internal parts towards the ſea, will be felt in a greater or leſs degree, according to its ſtrength, and as it conſpires with or oppoſes the general eaſtern current.

This ingenious gentleman intends ſoon to publiſh a work entitled " Meteorological Obſervations and Eſſays", containing ſeveral new improvements, particularly relative to the theory of the variation of the Barometer, of Rain, of the Trade Winds, &c. together with a full diſcovery (as he apprehends) of the cauſe of the *Aurora Borealis.*

SUP. QU. 2. *Anſwered by Mr. Joseph Dawbney.*

I have heard that the cuſtom of ridiculing taylors is owing to a certain text in St. Matthew, chap. ix. ver. 16. " No *man* putteth a piece of new cloth into an old garment ;" but it is known that tailors commonly do ; whence, by laying the empha- ſis on *Man*, the aſſertion to me does not appear improbable.

The ſame, by Mr. John Jackson, of Hutton-Rudby.

The cuſtom of ridiculing taylors merely for their profeſſional character, can have ariſen from nothing, but the effeminacy of their profeſſion ; the uſe of the needle being an exerciſe more peculiarly adapted for the practice of the *fair-ſex,* than for the employment of *a Man.*

The same, by Mr. E. Wilson, London.

Whatever is singular, attracts the attention of mankind; and to speak of such, or apply comparisons, is generally considered as a reproach. The sedentary life of taylors, and the bad posture in which they work, is liable to make them puny, ill-looking men, and often awkward in their gait. Besides, there is something so effeminate in seeing a man employed with a needle, that we need not wonder at their becoming a professional reproach: and most of them being of the poorer class, this contributes, though very unjustly, to increase the ridicule.

Sup. Qu. 3. Answered by Mr. T. Browne.

The texture of iron or steel consisting of earth, salt, and sulphur, we may account for the effects described in the query, by attributing them to the inflammability of the sulphur contained in it, which causes a sort of an exhalation to fly to the surface, where it is condensed by the upper air, and produces the colours. The reason why the under side suffers no change, we may suppose to be owing to the proximity of the fire which forces the exhalation upwards.

The same, by Mr. John Dalton.

Burning of charcoal produces the aerial acid; hence the steel is corroded by being exposed to this acid; but why the upper side alone should be corroded, or discoloured, and not the under also, I see no reason, and am inclined to doubt whether it is a general fact.

Sup. Qu. 4. Answered by Mr. Ralph Burton, of Salton.

Although it has been proved by experiments, that the growth and increase of vegetables chiefly depend upon fluids, which are in some measure locked up and restrained in those bodies for a time; yet as soon as a dissolution takes place, which will sooner or later happen, the fluid particles are then at liberty to assume their original form, power, and office. And whatever moisture is raised by heat, or the sun's rays, or the action of winds, &c. always condenses again in the atmosphere, and descends in rain, dew, snow, &c. Indeed it is not improbable that some fluids may descend through fissures, towards the more interior parts of the earth, and so diminish the fluids on the surface.

The same, by Mr. John Liddle, of Hovingham.

It is found by experiments on vegetables, that solids increase, fluids decrease, and the earth remains the same, consequently in this case may in time become a sapless mass. but bodies produced by fixation of fluids, are liable to a dissolution, as such, mingle with vapours exhaled from the earth, and consequently circulate as before.

The same, by the Proposer, Mr. Tho. Ridout.

That the globe which we inhabit was originally a fluid mass,

its form and texture or composition, are a sufficient demonstration. For, as to the form, philosophers and mathematicians assure us, that a body of water suspended in space, void of external attraction, would by the laws of gravity naturally take the form of a sphere[*]; but that if a rotation on an axis be given to this sphere, it will then take a spheroidical form, and by accurate admeasurements this has been found to be the true form of the earth.—Then as to its texture or composition, [*] the hardest stones, sea salt, nitre, vitriol and sulphur, are found to consist chiefly of water; the parings of lead, tin, and antimony, by distillation yield water plentifully; all birds, beasts and fishes, insects, trees and vegetables, grow from water; it assumes external shapes from accidental causes; the mountain is as much a body of water, as the cake of ice that melts on its brow; and even the philosopher himself is composed of the same materials, with the cloud or meteor which he contemplates. Water, as to its bulk, is increased by freezing, and diminished by assuming the solidity of stones, shells, earth, minerals, &c. Of these, and such-like materials, do the highest mountains consist, and afford a convincing proof, that water once covered their summits, and which in an immensity of time, gradually formed their prodigious bulks, at the expence of its own. Dr. Cheney, as quoted by Dr. Goldsmith, suspected that the quantity of water on the surface of the earth was daily decreasing, for, says he, "some of its parts are continually joined to vegetable, animal, and mineral substances, which no art can recover; united with these, water loses its fluidity. Thus, according to him, the world is every day growing harder and harder, and the earth firmer and firmer; and there may come a time, when every object around us may be stiffened in universal frigidity". And thus may the earth be compared to the human body, which in its infancy has a redundancy of fluids; its maturity, when both fluids and solids are in equal perfection; old age and dissolution, when its thickened and scanty fluids, no longer able to circulate, shall be rendered unfit to sustain either animal or vegetable life.

Many ingenious Answers to the Queries, both in the Diary and Supplement, were given by Messieurs James Ayres, Tho. Browne, John Burrow, Ra. Burton, John Dalton, Jos. Dawbney, Rd. Dening, Ja. Dennington, Miss Nanny Dent, Rd. Elliott, Tho. Elmer, Rev. J. Ewbank, J. Furnass, Geo. Gibbs, M. H., Rob. Hendy junr. Tho. Hornby, J. Jackson, Tho. King junr, Fra. King, M. Laidman, John Liddell, Miss A. W. Maken, Mrs. Di. Mason, Miss Nancy Mason, Hen. Mallanby, Oedipus, John Nuttall, T. Ridout, John Rutherford, Alex. Rowe, Wm. Wardley, and E. Wilson.

[*] See Goldsmith's Hist. of the Earth and Animated Nature.

NEW ENIGMAS.

I. ENIGMA, *by Mr. John Bayley, of Middleton.*

Ye ladies fair, who each succeſſive year,
Make the abſtruſeſt riddles to appear,
Diſcloſe my name, aſſert my power on earth,
Since from your charms I do derive my birth.
I was in Paradiſe, as moſt believe,
Begun by Adam, and by mother Eve.
Something I am, but what I ſcarceiy know,
Whom all have felt, but no one ever ſaw,
My ſhort exiſtence juſt in nothing lies,
Lives but in birth, and by creating dies.
And yet in me are ſuch ſtrange magic arts,
As have been known ſometimes to exchange hearts.
Perhaps ye fair, love would grow cold, and die,
Were I not helping to its warm ſupply.
At meeting, lovers ſeek me to obtain,
Tho' light as air, and like a phantom vain.
At parting, they in me do much confide,
To keep invariably their hearts ally d.——
Ladies, to tell my name, don't crack your brains,
But if you ſhou'd, e'en take me for your pains.

II. ENIGMA, *by Mr. John Brown.*

Ere you, ye fair, trod this terreſtriai ſphere,
I being had from God, who form'd the year;
Whoſe potent arm ſuſtains this earthly ball,
Whoſe care preſerves, protects, and governs all.——
When Adam firſt view'd Eden's bliſsful ſhade,
The ſun (juſt taught) his orient beams diſplay'd;
And all was good, all nature ſmil'd in green,
Low couch'd he lay—I clos'd the beauteous ſcene.
Since then, all ages I've preſided o'er,
Tho' oft has been uſurp'd my legal pow'r.
The ſanguine warrior, taught in ſchools of war,
With valor fraught, or ſcorns to run or fear,
To me obſequious bows—fame's fled away,
And huſh'd he falls, this hero of a day.
Alike the king, the ſlave, the poor, the great,
Soon vanquiſh'd all, lie proſtrate at my feet.
To youth my favours I profuſely grant,
Theſe copious powers old age do frequent want.
Behold, ye fair, nor let it cauſe alarms,
'Tis chief to me you owe your lovely charms;
The roſy cheek, the quick and brilliant eye,
Without my aid, ſoon languiſh, fade, and die;
What moſt affects your ſenſe, your heart is near,
I oft pourtray—your boding ſpirits bear,

Thro' woods or groves, or o'er the flowing main,
Stupendous rocks—yet land you safe again.—
Too much I've said—I must retract my breath,
You'll me descry, an emblem fit of death.

III.   ENIGMA, *by Lavinius, of St. Kitt's, formerly of
Lancaster.*

Ye charming fair, tho' me no muses fire,
Yet, rous'd by beauty, will I sweep the lyre:
Hence, while my hero's merits I proclaim,
Your plaudits shall eternalize his name.
  From whence he sprung, it matters not to say,
Or form'd of noble or plebean clay,
Tho', low as other folks, he pleas'd to dwell,
In former days, it matters not to tell.
Aloft, where round him air refining blows,
How restless he! to merit your applause:
There hardships wait that man cou'd ne'er sustain,
The dog-star's heat, and winter's pealing rain.—
Perchance some tempest of the north-wind's rage
May bow this miracle of worth and age;
Ev'n to the last will he the truth disclose,
Undaunted, tho' he perish in the cause.
  When ceaseless rains have spoil'd the farmer's hope,
And Ceres trembles for her rising crop;
The merchant, when his barks awake his fear,
And Susan when she hopes her sailor's near;
All raise for truth to me their wishful eyes;
A trusty friend who ne'er that truth denies.
What need I farther—sure he's known to all,
When trade looks brisk, or commerce glads the ball;
Cowards who dare not what they would allow,
And backward shrink from many a plighted vow,
Are nought to him—tho' namesakes—For, you see,
Emblem of courage stern and constancy!
A name high honour'd, old in song, he bears,
For wounds renown'd and glory in the wars.——
  But soft—no more my hero I pursue,
  My lyre is out of tune—ye charming fair adieu!

IV. ENIGMA, *by Mr. Tho. Nield, Master of the Boarding-
school, Hawarden.*

If rural scenes should lead your steps astray,
You'll see me glaring in the sunny ray;
Imperiously revolv'd with utmost force,
I conquer all who dare obstruct my course;
And thus I, Hector-like, range up and down,
O'erthrow my foes, myself with honours crown

Make rank and file bend to my conqu'ring hand;
All share the rigours of my dread command.
     Now turn your eyes, a train of nymphs you'll see,
Who wait observant underneath yon tree;
With hasty strides, and vengeance in their mien,
Seize us, the victims, by the tyrant slain,
With frightful fangs, those fangs of piercing steel,
Fresh tortures from them we are forc'd to feel;
Then studying how to wreck on us more pain,
In piled heaps we decorate the plain.
Soon thro' a scene more fatal we're to go,
Ere we're complete, or finish'd be our woe;
For from the place of combat we're convey'd,
And to Hippona we're an offering made;
Now we've a fiercer conflict to engage,
Which is the sole completing of their rage;
For soon we mingle with our mother earth,
From whence our conq'ring hero claims his birth.
Now from these hints, pray find the hero's name;
Tell to the world his merit and his fame.

V. Enigma, *by Mr. J. Stainmore, Grammar-school,*
Newport, Isle of Wight.

Let Dia's page, replete with puzzling lore,
Boast of her heroes, and their worth, no more;
Long has she roam'd thro' all creation wide,
To soothe her vot'ries' vanity or pride.
But hush, and see me come to work their fall,
T'eclipse their glories, and outshine them all.——
Behold me guarded with majestic pride,
A faithful friend attends on either side,
And wheresoever any foe appears,
My guards advance a thousand bristly spears;
And tho', as sometimes is the case, I fly
In half an instant 'twixt the earth and sky,
Or 'twixt the moon and mountain's grassy side,
Or o'er the distant landscape swiftly glide,
Yet still my guards attend me, arm in arm;
For shou'd I once but get a trifling harm,
To you, ye gents and fair, I am so dear,
There is not one that wou'd not shed a tear.
Without my aid in vain were god's decree,
When he proclaim'd aloud, let the light be;
Without my aid, beauty were useless found,
Whilst dark and horror reigns for ever round.——
Altho' you've seen me such a wondrous elf,
I've a twin brother equal with myself;
Without a mouth, I'm made with such nice art,
I can speak peace or terror to the heart.

Another hint I'll give to find my name,
Tho' you reverfe me, ftill I'm found the fame.

VI. ENIGMA, *by Mr. W. Tarmior, Neath, Glamorgan-fhire.*

Our worth is well known, and our ufes are great,
In arts or in fcience, as well as in ftate ;
We teach you all languages, yet never fpeak,
Either Englifh or French, or Latin or Greek.
Our family's large, yet we know not each other,
Tho' fome of us feem to acknowledge a brother.
Moft of us are cloth'd, which oft you have feen,
Some in red, fome in black, fome others in green :
And always our parent, 'tis true in good troth,
Has the devil's affiftance in bringing us forth.
Yet from his vile hands many truths are made known,
And figns of great learning and elegance fhewn.
One hint I would give, ftill your genius to try,
We are nearly related to great Lady Di.——
Prefented fometimes we have been to the king,
As a learned, a curious, an elegant thing ;
When to honour our parent, as well as ourfelves,
We moftly are order'd to fit upon fhelves.

VII. *or* PRIZE ENIGMA, *by Mr. Tho. Browne.*

[*Whoever anfwers it before Candlemas-day, has a chance, by lot, for Ten Supplements.*]

Your moft obedient, ladies! I appear,
With Madam Di, an herald of the year ;
But ere her ladyfhip has left the town,
I've paid a vifit to you ev'ry one.——
'Tis faid, when dire Medufa's head appear'd,
Where hiffing fnakes their fhining crefts uprear'd,
In fixt amaze the fad fpectator ftood,
While chilling horror crept thro' all his blood,
Thro' ev'ry vein the dire infection ran,
Till fhew'd a ftatue, what but late was man ;
Gorgonian power on my fteps attends,
And fixt are all where'er my ftep extends :
Tho' no dread horrors cloud my afpect fair,
Or twining fnakes fupply the want of hair,
With me appears more bright each rural fcene,
The fkies cerulean, placid, and ferene.
Tho' mild my air, tho' calm the azure fky,
Ye fair, you fhudd'ring from my prefence fly ;
(Some ftrange difguft my coming muft infpire)
Swift you avoid me, to your rooms retire,
There, fhut without impertinence and me,
You fit at eafe, from all intrufion free.

But let me tell you—to my words attend,
To health and beauty I'm a conftant friend;
No rouge or wafh the fearlefs fair-one needs,
Alone with me who boldly roves the meads;
I o'er her cheeks a rofy luftre throw,
And bid the genuine hue of beauty glow.—
Sometimes indeed the tempeft rufhes forth
From the rude chambers of the boift'rous north,
And brings me with it rapt along from far,
Amidft the rage of elemental war.
Yet in the ftill ftar-fpangled filent night,
I moft am found, then moft appear in fight.
But hufh—I fear I've almoft told my name,
Enough is faid, to point out what I am.

New Rebuses, Charades, and Queries.

A Dish *of* Fish; *including a few Hints for young Anglers,*
and a fmall Tribute to the Memory of Mr. B. Weft, late
of Weedon-Beck; by Mr. Wm. Jones, of Heyford.

Attend all ye fair who love frefh-water fifh,
And from Nen's winding ftream I'll prefent you a difh;
For on her verdant banks, when the ev'nings are fine,
For diverfion I rove with my rod and my line.
With brandling well fcour'd, or nicely form'd fly,
I often fucceed with the filver-fcal'd fry;
As often exclaim, and prepare to depart,
Thofe poachers catch all—I'll relinquifh the art.
When the float gently nodding frefh ardour fupplies,
A flutt'ring impatience oft lofes the prize.
Then clofely, ye Tyros, adhere to the rule,
That directs to be patient, and fteady, and cool;
And too near the clear ftream be fure you ne'er ftray,
A glimpfe of your form foon frights all away.
To the varying feafon, the fize, and the kind,
Adapt the beft bait, and obferve well the wind.
Thefe hints I've fubmitted, forgive the digreffion,
But " Practice makes perfect" in every profeffion.
   Proceed now my mufe and no longer delay,
To fet forth each fifh in a myftical way.

1. A meafure for land will the firft bring to view;
It pleafes the fportfman and epicure too.
2. Three-fifths of what Sylvia frequently fends,
With compliments fraught, to her intimate friends,
And one-fifth of what oft fhe begs they will make,
With herfelf and Belinda a ramble to take,
Will name a large fifh on which you may dine,
When properly ftew'd with the juice of the vine.

3. One half of the place to which Christians repair,
   And one third of an insect oft seen in the air,
   Will name you another in class like the second,
   And dress'd in like fashion its equal is reckon'd.

4. One third of a coin which 'tis pleasing to see,
   Could the poet but grasp it, how happy he'd be !
   To this join five hundred, with half of the name
   By Britons most honour'd, and well known to fame,
   And one third of what often is found in the wood,
   Will truly discover a fish that is good.

5. Three fourths of the outside of apple or pear,
   The name of another will fully declare,
   Esteem'd quite delicious, surpassing most other,
   If serv'd as one wrestler is serv'd by another.

6. A weapon oft handled by heroes of old,
   But now laid aside will the last fish unfold,
   Which fill'd with a pudding, and hot from the spit,
   When set on the table most palates will hit.
       Cease now simple muse, and no longer pursue
   A subject once pleasing—to Nen bid adieu.
   Now cheerless and drooping I rove by her shore,
   The scenes once delightful delight me no more ;
   Her moss-woven banks all their velvet have lost ;
   Her meadows no more are with flowers emboss ;
   Her music no longer with rapture I hear ;
   Her willows more gloomy and darksome appear ;
   Their tears sympathetic afford me relief ;
   Their weeping can never diminish my grief ;
   The muses with anguish have left their lov'd stream,
   Soft Nen and her nymphs will no more be their theme,
   Their fav'rite's no more—yes Lysander is dead,
   The fates urg'd by envy have sever'd his thread :
   Hence the cause of my grief—the source of my pain ;
   His converse no more will enliven each scene ;
   In youth's early season the friendship began,
   Which time still improving cemented in man ;
   Congenial sentiments fann'd the soft flame,
   Thro' life's adverse tempests it still glow'd the same ;
   Then blame not, ye fair-ones, this sorrow-fraught strain,
   A friend like Lysander but few can obtain.

I. Rebus, *by Mr. Tho. Browne.*

What, ye fair, above all things, ye mostly fear
On your virtue, your dress, or character appear ;
This found, if you can, you must nicely suspend
The whole of a ponderous weight at the end ;
Lastly add what that is which two hills do embrace,
And in which oft a river displays its bright face ;

'Tis the name of a place where resides a fair poet,
Whose wit—but her works in the Diary best shew it.

II. Rebus, *by Cestriensis.*

An isle in ancient history well known,
Where headlong from heaven a god fell down;
Idomeneus' son, by Ulysses slain;
The god that ruleth o'er the liquid main;
A Trojan, swift in foot, but slow in sight,
Sent by Ulysses to the realms of night;
Fam'd Oegrus' son, renown'd for pow'r of song,
Whose music drew e'en woods and trees along;
A Roman emperor, whose deeds disgrace
The name of man, and blacken all the race.
The initials join'd, a city will be found,
For arts and commerce o'er the world renown'd.

III. Rebus, *by Mr. John Fildes, Schoolmaster, Liverpool.*

What all men seek for in this life below;
What greedy misers seldom will forego;
A thing for brightness equal'd but by few;
What in the beast was found that Sampson slew;
The fair but feeble mother of us all,
And what she did that caus'd her sudden fall:
Th' initials join, and you will have in sight,
A bard whose verses give to all delight.

IV. Rebus, *by Mr. Wm. Ward, Academy, Lough-borough.*

A city, wall'd by servile gods;
A bird, that mischief oft forebodes;
As reverend matrons, bent with age,
Affirm, and from its cries presage:
A king, renown'd for subtle arts;
A prebend, of superior parts,
Whose wit severest critics praise:
He who to Cromwell tun'd his lays;
She, from whose fruitful womb we sprung;
The dame whose praises Petrarch sung;
A city, in itself complete;
Renown'd for arts, the muses' seat.
Th' initials join'd, expose to view
A tuneful bard.—Ye fair adieu.

I. Charade, *by Mr. Olinthus Gregory.*

Forbear, rash youth, nor with such thoughtless haste
Tread in the footsteps of yon giddy train,
Lest everlasting mis'ry be thy lot:
Think! think! vain man, that thou ere long may'st be

A silent dweller in my dreary firſt,
Where thy once lovely frame muſt turn to duſt.
The parſimonious churl, whoſe frigid ſoul
In thoughts of gold and callous apathy is wrapt:
His harden'd heart to charity eſtrang'd,
May to my ſecond fitly be compar'd.
Lo! yonder hallow'd ſpot, where trees of yew
Extend their weeping branches o'er the ground,
And form fit dwellings for the ſcreeching owl:
'Tis there my whole is found, with ſculptur'd face,
Bedeck'd with emblems fair, and ruſtic verſe,
The ſtudied produce of a village muſe.

II. CHARADE, by Mr. John Tho. Hughes, Cotherſtone, near Barnard Caſtle.

In parching heat my cheering firſt to ſhare,
See hands uplifted pour the ardent pray'r!
My next, well ſkill'd to wing the miſſile dart,
Which furious pierc'd great Harold's manly heart.
Could Reuben's touch or Reynold's arts diſplay,
The luſtre of my whole's enlivening ray?

III. CHARADE, by Mr. Henry Mellanby, Stockton.

O gentle firſt, when thou'rt revers'd,
And Chloe is inclin'd,
That Hymen's bands ſhall tie our hands,
My whole you then may find.
Folks uſe my laſt to keep things faſt:
Now ladies, if you pleaſe,
The ſource diſcloſe of bliſs or woes,
Which you can ſolve with eaſe.

IV. CHARADE, by Vertigo.

The wretch who ne'er repented till too late,
Oft on my firſt rides forth to meet his fate,
To where the gibbet glooms upon his ſight,
Prepar'd to ſink him in eternal night:
Search for my next where Dover's craggy ſteep
Frowns o'er the fury of the angry deep:
When adverſe hoſts ſtand ready to engage,
In all the fury of vindictive rage,
Then from the brazen hold of death my whole
Burſts forth and ſtrikes with dread the hero's ſoul.

I. QUERY, by Mr. John Burrow, Boltonfield.

What is the reaſon that cats, eſpecially black ones, appear luminous when ſtroaked in the dark?

II. QUERY, by Mr. James Dennington, London.

Required the nature and end of Volcanoes.

III. QUERY, *by Mr. Tho. Hornby, Wombleton.*
What is the reason that a piece of burnt limestone, when water is poured upon it, falls to powder?

IV. QUERY, *by Mr. Tho. Ridout, Canterbury.*
By what operation of nature are flints produced?

Of the SOLAR *and* LUNAR ECLIPSES, *&c. this year.*

There will happen this year six eclipses of the two great luminaries, viz. Four of the Sun and two of the Moon, and one of each will be visible in these parts. They happen in the following order:

I. The SUN is visibly eclipsed on Friday January the 31st, in the forenoon. This will be but a small eclipse, but will be visible here as well as in the more northern parts, viz. Denmark, Sweden, Norway, &c. where the defect will be much larger than with us. The times and appearances, and type at the middle, for Greenwich or London, &c. will be as below, where *b* is the place of the beginning of the eclipse, about $40\frac{1}{2}$ degrees below the vertex on the right hand, and *e* the end of it a little below the vertex on the left hand.

Jan. 31, morning.
Beginning　　-　10ʰ 56ᵐ
Middle　　　　-　11　45
End of ecl.　　-　0　$33\frac{1}{2}$ aftern. Digits eclipsed - 2° 40′.
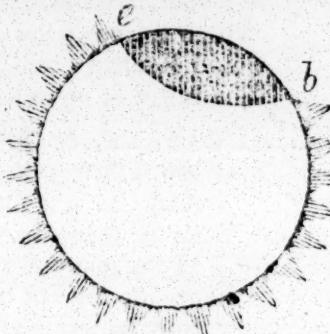
II. *February* the 14th, in the afternoon, is a total and visible eclipse of the MOON, and almost central, as the centre of the moon passes nearly through the centre of the earth's shadow; consequently the eclipse will be very large, and of long duration. At the middle of the eclipse the moon is vertical to the southern parts of Nubia in Africa, near the side of the Red Sea, opposite its middle part, in about $12\frac{1}{2}$ degrees of north latitude, and 28 degrees of longitude east from London; but at the beginning of it she is vertical near the island of Socotora, at the mouth of the Red Sea, in latitude 13 degrees north, and long. 57 degrees east
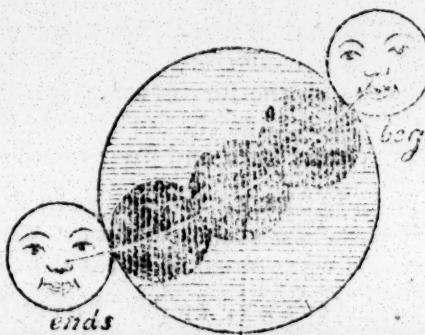
of London; and at the end, fhe is vertical to the middle of Negroland, about $12\frac{1}{2}$ degrees north latitude, and $\frac{1}{2}$ a degree long. weft of London; confequently the whole of this eclipfe will be vifible to all the nations of Europe and Africa, with the weftern parts of Afia, and the eaftern parts of America; but towards the eaftern parts of Afia, only the fore part of the eclipfe will be vifible, as the moon fets there before the eclipfe is over; and in the more internal and weftern parts of America, only the latter part can be feen, as the moon there rifes eclipfed.—The type is as above, and the calculation as below:

Beginning of the eclipfe	-	8^h 7^m aftern.
Beginning of total darknefs	-	9 $12\frac{1}{2}$
Middle of the eclipfe	- -	10 $5\frac{1}{2}$
End of total darknefs	-	10 $58\frac{1}{2}$
End of the eclipfe	- -	12 4
Duration of total darknefs	-	1 46
Whole durat. of eclipfe	-	3 57

III. *March* the 1ft is a folar eclipfe, which happens about 10 at night, and confequently is invifible here, being after funfet; but it may be feen in the fouthern parts of America, Africa, and the new difcovered iflands and countries in the great South and Pacific Oceans. The conjunction happens at 9^h 54^m time of Greenwich, in longitude 11^s 11° $36'$, the moon's lat. being 1° $22\frac{1}{4}'$ fouth.

IV. The 4th is another Solar eclipfe, July the 26th, alfo near 10 at night, and confequently invifible here; but may be feen, like the laft, in the more fouthern parts of the world. The conjunction is in longitude 4^s 3° $57'$, at 10^h 3^m Greenwich time, the moon's latitude being 1° $15\frac{1}{4}'$ fouth.

V. The 5th is another total eclipfe of the Moon, which happens on Monday the 11th of Auguft, about our $\frac{1}{2}$ paft 7 in the morning. It will not be vifible to the nations of Europe; but as at the time of the middle of the eclipfe the moon is vertical to the Pacific Ocean, about 15 degrees fouth lat. and 111 degrees long. weft from London, the eclipfe will be vifible to all the continent of America, excepting the more northern parts of it, about Baffin's Bay, &c.; and alfo vifible to moft of the new difcovered countries in thofe feas, as New Zealand, New Hebrides, the Society Ifles, Friendly Ifles, Sandwich Ifles, &c. The moon will rife totally eclipfed on the eaftern coaft of New South Wales, as Botany Bay, &c.; and the beginning of the eclipfe will extend itfelf as far eaftward as the Cape Verd iflands, and the moft weftern parts of Africa.

VI. *Auguft* 25th is the 6th and laft of thefe eclipfes of the Sun, at our $\frac{1}{2}$ paft 12 at noon. But at the time of this eclipfe the moon's latitude north is too great to make this any eclipfe to

us. But to the more northern nations of Europe, as Norway, Sweden, Lapland, and Ruffia, this will be an eclipfe. The conjunction is at $0^h 23^m$ in long. $5^s 2° 25'$, the moon's lat. being $1° 20'$ north.

ADDITIONS, CORRECTIONS, &c.

REMARK *by Mr. Olinthus Gregory.*

In the 4th Query in the Supplement for 1792, it is required to point out the firft perfon who conftructed an air pump, to have the motion of the hand continued one way; but as that is not done in the Supplement for 1793, I hope it will not be deemed improper in me to communicate the following extract from Dr. Defaguliers's Experimental Philofophy, vol. ii. page 377.—" Mr. William Vream, who was my operator for philofophical machines, altered Mr. Haukfbee's pump, fo as to have the handle turn round always one way in its operation, by means of a crank, which by two leading pieces gives the wheel that moves the racks a motion of two thirds of its circumference every time the crank goes round, whereby the ftrokes are quicker, though fhorter. What advantages he thought he gave Haukfbee's pump by it, take in his own words." After he had copied Haukfbee's defcription of his pump, he fays,——" Thus far Mr. Haukfbee has defcribed the pump, which I hope I have fince improved by a contrivance, whereby in turning the winch quite round, the emboli or piftons are alternately raifed and depreffed; whereas in Mr. Haukfbee's way the moving of the hand backward and forward is not only more troublefome, but fhakes the pump; becaufe it is required to prefs the piftons hard againft the bottom piece under the barrels to difcharge the water from the valves at every ftroke. Befides, if the pump fhould at any time happen to leak, when an experiment fhould be made in hafte, you may exhauft fo faft this way, as to make your experiment without being at the trouble to pull the pump in pieces, in order to make it tight, except in fuch cafes as require the recipient to be perfectly exhaufted." A farther defcription of the above improvement may be feen in the above work, page 378.

Errata in laft Supplement.—Page 36, line 11 from the bottom, for $1200 \div 10$ read 1200×10.—Page 47, line 26, dele *the acre,* at the end.—Ib. line 36, dele *given.*

N. B. Letters that contain contributions for the Diary or Supplement, to be fent before the beginning of May, addreffed to Dr. Hutton, Woolwich, (poft paid, or they will not be received.) Some Letters always come too late to be properly noticed.

ANSWERS *to the* MATHEMATICAL QUESTIONS *propoſed in the laſt* SUPPLEMENT.

I. SUPP. QUESTION 29 *anſwered by Mr.* James Aſhton, *of Harrington.*

By the true rule, as laid down in Dr. Hutton's Arith. pa. 93, put $p = 100$, $t = 1$, $P = 105$, $T = 3$, $r = 05$; then take $a = T + t + \dfrac{P + p}{pr} = 45$, and $c = Tt + \dfrac{PT + pt}{pr} = 86$; hence $\frac{1}{2}a - \frac{1}{2}\sqrt{a^2 - 4c} = 2$ years, the true equated time.

The common method makes it $2\frac{1}{4\frac{1}{7}}$ years; but this cannot be true, for here the intereſt of a ſum of money is conſidered as being the ſame as the diſcount, which is abſurd.

The ſame anſwered by Mr. James Dennington, *London.*

This queſtion is the ſame in ſubſtance as the 7th of Ladies' Diary for 1721, the ſolution to which at p. 191, Hutton's Diarian Miſcellany, vol. 1, is as follows:

It is evident that the intereſt of 100l. for the time it is kept after it is due, muſt be equal to the diſcount of 105l. for the time it is received before it is due: putting then the time for the diſcount $= x$, then $2 - x$ will be the time for the intereſt; hence $5 \times \overline{2 - x} = 10 - 5x$ is the intereſt of 100l. for the ſaid time, and $100 + 5x : 5x :: 105 : \dfrac{105x}{20 + x} = $ the diſcount of 105l. for the time x. Therefore $10 - 5x = \dfrac{105x}{20 + x}$, and hence $x^2 + 39x = 40$, where $x = 1$; ſo that the whole is to be paid at the end of 2 years exactly.

Mr. Joſ. Garnett, *jun. of Richmond, Yorkſhire, ſays,*

The anſwer is 2 years. —— The intereſt of the 100l. kept a year after it is due, being evidently equal to the diſcount of the 105l. paid a year before due.

N. B. This is the principle on which the true general theorems, given by Dr. Hutton, in his Arithmetic, under the article Equation of Payments, is founded; and to which I cannot ſee any objection.

This queſtion was alſo anſwered by Meſſrs. James Adams, Wm. Armſtrong, Job Ayres, G. B, Geo. Baron, Henry Bell, J. Bickford, John Bruce, Wm. Burdon, Ra Burton, John Cavill, Tho. Cram, Rob. Cundall, Wm. Davis, Rd. Dening, Rd. Elliott, L. Evans, J. Ewbank, Geo. Foy, I. Furnaſs, J. Hartley, Tho. Haſtehurſt, I. Hutherſal, Tho. Hewitt, J. Jackſon, Wm. King, Tho. Leybourn, John Liddell, Miſs Nancy Maſon, Tho. Milner, John Mitchell, Tho. Molineux, C. Nichols, Joſ. Oldfield, Jacob Park, C. Pritty, Wm. Robinſon, Alex. Rowe, Ra. Simpſon, Wm. Tarmior, Tho. Thompſon, Sam. Thompſtone, T. Watſon, Rob. Wilkinſon, and John Wright.

C

II. QUESTION 30 *answered by Mr.* Wm. Tarmior, *Neath, Glamorganshire.*

It is evident from the question, that if the thickness of the cloth is $\frac{1}{20}$ of an inch, the diameters of the circles made by the rounds of cloth will increase $\frac{1}{10}$ of an inch every round; hence $\frac{1}{10}$ or ·1 is the common difference of the diameters, and consequently $3·1416 \times ·1 = ·31416$ is the common difference of the lengths or circumferences of the rounds, which are in arithmetical progression. Now $25 + ·31416 = 25·31416$ is the length of the first round of cloth, (taking the diameter to the outside of the round), and $25 + ·31416 \times 90 = 53·2744$ is the length of the last round, the number of rounds being 90; hence $25·31416 + 53·2744 = 78·58856$, the half of which is $39·29428 =$ half the sum of the extremes; which multiplied by 90, the number of terms, gives $3536·4852$ inches $= 98·2857$ yards, the length required.

The same answered by Mr. John Mitchell, *of Pleasington School, near Blackburn, Lancashire.*

As the diameters of the beam and cloth increase in arithmetical progression, the circumference will do the same. Then, by taking the circumference in the middle of the thickness of the web, there is given $25·15708 = a$ the first term, $·31416 = d$ the common difference, and $90 = n$ the number of terms, to find s the sum of all the terms; the theorem for which, by arithmetical progression, is $(a + \overline{n-1} . \frac{1}{2}d)\, n = s$, that is, $(25·15708 + 89 \times ·15708) \times 90 = 3522·348$ inches $= 97·843$ yards, the answer.

Or, by taking $a = 25·31416$, the circumference of the first ring of cloth, taking its diameter to the outer side of it, the length will be $3536·4852$ inches, or $98·2357$ yards.

The same answered by Mr. Tho. Milner, *of Catterick.*

Let $DE = 25 \div 3·1416 = 7·95741$ the diameter of the beam's end, and $AB = 7·95741 + 90 \times \frac{1}{10} = 16·95741$ the outer diameter of the cloth when wrapt about the beam, the sum of the two is $24·91482$, and their difference 9. Now the space included between the two concentric circles, will be equal to the length of the web multiplied by its thickness; therefore (by Dr. Hutton's Compendious Measurer, pa. 119) $24·91482 \times 9 \times ·7854 = 176·1129$ inches is the area of the included space; which divided by $\frac{1}{20}$ of an inch (the thickness of the cloth) or multiplied by 20, gives $3522·258$ inches, or $97·84$ yards, the length of the web required.
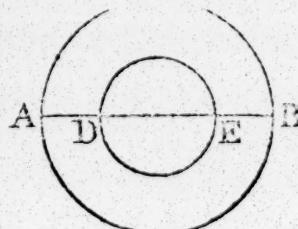
The same answered by Mr. Geo. Baron, South Shields.

As $22 : 7 :: 25 : \dfrac{175}{22} =$ diameter of the beam, and $\dfrac{175}{22} +$

$\dfrac{1}{20} \times 90 \times 2 = \dfrac{373}{22} =$ diameter of the beam and cloth. Then,

per pa. 112 Dr. Hutton's Mensuration, $\dfrac{373 + 175}{22} \times \dfrac{373 - 175}{22}$

$\times \cdot 7854 = \dfrac{274}{11} \times \dfrac{99}{11} \times \cdot 7854 = 176 \cdot 071 =$ the area of the

end of the ring of cloth; which divided by $\frac{1}{25}$, the thickness of
one fold, gives $3521 \cdot 42$ inches $= 97 \cdot 82$ yards, the length of
the web required.

*Other ingenious answers were given by Messrs. James Adams, Wm.
Armstrong, James Ashton, Job Ayres, G. B, Henry Bell, J. Bick-
ford, John Bruce, Wm. Burdon, Ra. Burton, Colin Campbell, Rd.
Carlisle, John Cavill, Tho. Cram, Rob. Cundall, Wm. Davis. Rd.
Dening, Ja. Dennington, Rd. Elliott, L. Evans, J. Ewbank, Geo.
Fay, I. Furnass, Jos. Garnett, J. Hartley, I. Hutherfal, Tho.
Hewitt, Tho. Hornby, J. Jackson, John Jennings, Wm. King, Tho.
Leybourn, John Liddell, Miss Nancy Mason, C. Nichols, Jos. Old-
field, Jacob Park, T. Ridout, Wm. Robinson, Alex. Rowe, Ra.
Simpson, Wm. Swain, Tho. Thompson, Sam. Thompstone, Henry
Wade, T. Watson, Rob. Wilkinson, and John Wright.*

III. QUESTION 31 *answered by Mr.* James Adams,
Schoolmaster, Plymouth Dock.

$A + B = \dfrac{2}{7} = \dfrac{80}{280}$ ⎫ 2d less 3d is $A - B = \dfrac{77}{280}$ ⎫ $2A = \dfrac{157}{280}$

$A + C = \dfrac{3}{8} = \dfrac{105}{280}$ ⎬ 2d less 1st is $C - B = \dfrac{25}{280}$ ⎬ $2B = \dfrac{3}{280}$

$B + C = \dfrac{1}{10} = \dfrac{28}{280}$ ⎭ Theref. by add. and subt. ⎭ $2C = \dfrac{53}{280}$

Hence the shares of A, B, and C, are as the numbers 157, 3,
and 53, respectively, the sum of which is 213; hence the
money may be divided as follows:

l.　s.　d.　q.

As $213 : 30$ ⎫ ⎧ $157 : 1 \quad 2 \quad 1 \quad 1\frac{29}{71} =$ A's share,
or $71 : 10$ ⎭ :: ⎨ $3 : 0 \quad 0 \quad 5 \quad 0\frac{20}{71} =$ B's share,
⎩ $53 : 0 \quad 7 \quad 5 \quad 2\frac{22}{71} =$ C's share.

The same answered by Mr. I. Hutherfal, *of Rochdale.*

The given fractions reduced to a common denominator,

$\dfrac{2}{7} = \dfrac{80}{280}$, $\dfrac{3}{8} = \dfrac{105}{280}$, $\dfrac{1}{10} = \dfrac{28}{280}$; and, rejecting the denomi-

nator, the proportional numbers are 80, 105, and 28; that is,

$A + B = 80$ ⎫ the sum of all three is $2A + 2B + 2C = 213$;
$A + C = 105$ ⎬ from this subt. double of each of the first three,
$B + C = 28$ ⎭ and it will leave the proportions of the shares,

C 3

viz, A $= 157$, B $= 3$, C $= 53$. Then the money (30 shillings) divided in this proportion, gives for their shares A $= 23\frac{8}{71}s$, B $= \frac{30}{71}s$, C $= 7\frac{33}{71}s$.

This question was also answered by Messrs. Wm. Armstrong, James Ashton, Job Ayres, Geo. Baron, Henry Bell, J. Bickford, John Bruce, Wm. Burdon, Ra. Burton, Colin Campbell, John Cavill, Tho. Cram, Rob. Cundall, Wm. Davis, Ja. Dennington, Rd. Elliott, L. Evans, J. Ewbank, I. Furnass, Jos. Garnett, Jos. Gittins, J Hartley, Tho. Haslehurst, Tho. Hewitt, Tho. Hornby, J. Jackson, Wm. King, Tho. Leybourn, J. Liddell, Miss Nancy Mason, Tho. Milner, John Mitchell, C. Nichols, Jos. Oldfield, Jac. Park, C. Pritty, Alex. Rowe, Ra. Simpson, Wm. Swain, Wm. Tarmior, Tho. Thompson, Sam. Thompstone, T. Watson, Rob. Wilkinson, and John Wright.

IV. Question 32 *answered by Mr.* J. Cavill, *of Beighton.*

It is well known that $3{\cdot}1416$ is the superficies of a globe whose diameter is 1, and $\sqrt[3]{20}$ the diameter of a globe whose solidity is $= 20$ of the former. And since all surfaces are as the squares of the diameters, it is $\sqrt[3]{400} : 50 :: 20 : 135{\cdot}72$ shil. $= 6$l. 15s. $8\frac{1}{2}$d, the answer.

The same answered by Mr. Ra. Simpson, *Sunderlandbridge Bar.*

When the diameter of a globe is 1, its solidity is $\cdot 5236$. and its convex surface $3{\cdot}1416$; also $\cdot 5236 \times 20 = 10{\cdot}472$ the solidity of the large globe, and $3{\cdot}1416 \times 20 = 62{\cdot}832$ is the convex surface of the 20 little globes : hence $\sqrt[3]{\frac{10{\cdot}472}{\cdot 5236}} = \sqrt[3]{20} = 2{\cdot}7144$ is the diameter of the large globe, and $2{\cdot}7144^2 \times 3{\cdot}1416 = 23{\cdot}1472$ its convex surface; therefore $23{\cdot}1472 : 50$sh. $:: 62{\cdot}832 : 6$l. 15s. $8\frac{1}{2}$d. nearly.

*The same answered by Mr.* Alex. Rowe, *Reginnis.*

Let $1 =$ solidity of a small globe; then $n = 20$ is the solidity of the large one. Then, per pa. 200, Dr. Hutton's Mensur. the cubes of their diameters are as n to 1, or the diameters as $\sqrt[3]{n}$ to 1. But by pa. 192, ibid. the squares of the diameters are as the surfaces, and the surfaces must be as the expence of gilding, hence then $\sqrt[3]{nn} : n :: s (= 50) : s\sqrt[3]{n} = 135{\cdot}72$shil. $= 6$l. 15s. $8\frac{1}{2}$d.

N. B. $s\sqrt[3]{n}$ is a general theorem, whatever be the size of the large globe.

Ingenious answers were also given by Messrs. J. Adams, Wm. Armstrong, J. Ashton, Job Ayres, Geo. Baron, J. Bickford, John Bruce, Wm. Burdon, Ra. Burton, Colin Campbell, Tho. Cram, Rob. Cundall, Ja. Dennington, Rd. Elliott, L. Evans, J. Ewbank, I. Furnass, Jos. Garnett, Jos. Gittins, J. Hartley, Tho. Hewitt, Tho. Hornby, I. Hutherfal, J. Jackson, Tho. Leybourn, John Liddell, Miss Nancy Mason, Tho. Milner, John Mitchell, C. Nichols, Jos. Oldfield, Jac. Park, C. Pritty, Wm. Robinson, John Ross, Wm. Tarmior, T. Watson, Henry Wade, Rob. Williams, and John Wright.*

V. Question 33 *answered by Mr.* J. Dennington, *London*.

Suppose VAB the parabola, and E F drawn as required by the question. Then 15 shil. : 1 ac. : : 16·08 : 1·072 acres = 107200 square links = area of the segment EB; but the area AVB divided by $\frac{2}{3}$ AB = 300720 $\div$ 384 = 783$\frac{1}{8}$ is the abscifs VD, and the area V E F = 300720 — 107200 = 193520; then because the areas of the two parabolas VAB, VEF are as the cubes of the ordinates, or the ordinates as the cube roots of the areas, therefore as $\sqrt[3]{300720}$: $\sqrt[3]{193520}$: : AB = 576 : EF = 497·302; and again, by the nature of the parabola, AB^2 : AB^2 — EF^2 : : VD : CD, that is, 576^2 : 576^2 — 497·302^2 : : 783$\frac{1}{8}$: 199·4 = CD the height of the piece required.

N. B. The two last words of this question are superfluous.

### *The same answered by Mr.* Tho. Hornby, *of Wombleton.*

The given area A = 300720 divided by $\frac{2}{3}$ of AB, or $\frac{2}{3}$ of 576, gives the abscifs VD = 783·125 links, which put = a, and the base AB = 576 = b. Now as the value of the land on one side of the abscifs is 20sh. and on the other side only 10sh. it is plain that one acre laid off parallel to the ordinate through both values is =15sh. therefore the area of the piece to be laid off, worth 16·08, is found by the rule of proportion = 107200 square links; this taken from the whole area 300720, leaves 193520 = the segment VEF = c, to find its abscifs and ordinate x and y. Now as $a : b^2 : : x : y^2$, hence $ay^2 = b^2 x$; also $\frac{2}{3}xy = c$ the area; then from these two equations is got $x = \sqrt[3]{\dfrac{9ac^2}{4b^2}} = 583·72 = $ VC; this taken from VD or 783·125, leaves 199·4 = CD the breadth of the piece.

N. B. This question was wrong printed, for the whole value of the piece cut off should be 16·08.

Ingenious solutions were also given by Messrs. James Adams, Wm. Armstrong, James Ashton, Job Ayres, Bengal Officer, Wm. Burdon, Ra. Burton, Colin Campbell, John Cavill, J. Ewbank, J.J. Garnett, J. Hartley, Tho. Hewitt, J. Jackson, John Liddell, Tho. Milner, John Mitchell, Jac. Park, Wm. Robinson, J. Rodham, *and* T. Watson.
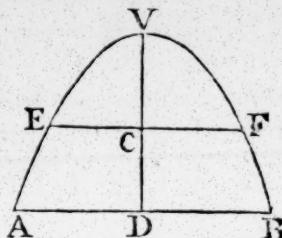
VI. Question 34 *answered by Mr.* Wm. Tarmior, *Neath, Glamorganshire.*

Divide the given rectangle A B C D into two equal parts by the diagonal AC. Then, by similar triangles, AB : BC :: AH : HK :: AF : FL.; HK, FL, and BC, being thus known, and drawn into AH, AF, and AB, half the products will be the areas of the three triangles AHK, AFL, ABC ; next subtract the first from the second, and the second from the third, and there will be known all the three areas AHK, HL, and FC ; then multiply these by their values per acre d, e, f, which will give the values of the same, and their sum the whole value of the triangle ABC. Then it will be, as this value of the triangle ABC is to the given value of the triangle ABE, so is BC to BE, the fourth proportional will give BE ; then draw AE, the line required. Which is the general and practical rule.

The same answered by Mr. T. Watson, *late of Alnwick.*

Make $AB = a + b + c = m$, $AF = a + b = n$, and $x = BE$. Then by similar triangles, $AB : BE :: AF : FN :: AH : HM$, which gives $FN = \dfrac{nx}{m}$, and $HM = \dfrac{ax}{m}$; hence the areas of the parts AHM, H N, and F E, are $\dfrac{a^2 x}{2m}$, and $\dfrac{a + n}{2m} bx$, and $\dfrac{m + n}{2m} cx$, and their values $\dfrac{a^2 dx}{2m}$, $\dfrac{a + n}{2m} bex$, and $\dfrac{m + n}{2m} cfx$; this sum put $= w$, whence will be found

$$x = \frac{2 m w}{a^2 d + \overline{a + n} \cdot be + \overline{m + n} \cdot cf}, = \text{the perpendicular B E}$$

of the required triangle.

The same answered by Mr. John Liddell, *Hovingham,*

Put x, y, z, for the arithmetical means or perpendiculars upon $\frac{1}{2} a$, $\frac{1}{2} b$, and $\frac{1}{2} c$, and $w =$ the proposed worth ; then is $adx + bey + cfz = w$, also put $g = a + \frac{1}{2} b$, and $h = a + b + \frac{1}{2} c$, then as $h : z :: g : y :: \frac{1}{2} a : x$, which give $x = \dfrac{az}{2h}$, and $y = \dfrac{gz}{h}$, which values of x and y being substituted instead of them in the equation $adx + bey + cfz = w$, it becomes $\dfrac{aadz}{2h} + \dfrac{begz}{h} + cfz = w$, and hence $z = \dfrac{2hw}{aad + 2beg + 2cfh}$, which put into words will give a general rule, that has been proved to be true, some time since.
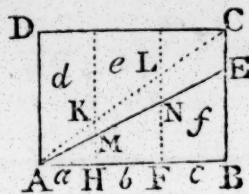
Other ingenious anfwers were given by Meffrs. Ja. Adams, J. Afh-ton, Job Ayres, G. B, Geo. Baron, J. Bickford, John Birch, Wm. Burdon, Ra. Burton, Colin Campbell, John Cavill, Tho. Cram, Ja. Dennington, L. Evans, J. Ewbank, I. Furnafs. Jof. Garnett, Tho. Hewitt, Tho. Hornby, I. Hutherfal, J. Jackfon, Tho. Leybourn, Mifs Nancy Mafon, Tho. Milner, John Mitchell, Jac. Park, Wm. Robinfon, and Rob. Wilkinfon.

VII. QUESTION 35 *anfwered by* Mr. J. Jackfon, *Hutton-Rudby*.

The place where they all met muft have been at the oppofite point of the pond, or at the end of the diameter, from the place where they plunged in; and the diftance that each fwam, equal to the femi-circumference of the pond, or 94·248 yards.—This queftion feems to have been fug-gefted by a very curious problem, being the 38th in Dr. Hutton's


Compendious Meafurer, pa. 84, 2d edition; where it is fhewn how " to divide a given circle into any propofed number of parts by equal lines, fo that thofe parts fhall be mutually equal both in area and perimeter;" which is thus: " Divide the dia-meter AB into the propofed number of equal parts at the points a, b, c, &c. Then on A a, A b, &c. as diameters, de-fcribe femi-circles on one fide of the diameter A B; and on B c, B b, &c, defcribe femi-circles on the other fide of the dia-meter; fo fhall the correfponding joining femi-circles divide the given circle in the manner propofed.

Mr. J. Bickford, after a folution nearly in the fame manner, obferves, that the demonftration of this problem is to be found in Dr. Hutton's Mathematical Tracts, vol. 1, where each path is proved to be equal, and each equal to the femi-circumference of the circle, and that they divide the circle into equal parts; and the fame principle is there farther extended to the divifion of ellipfes, and to the divifion into parts in any proportions whatever.

This curious problem was alfo anfwered by Meffrs. Colin Campbell, Ja. Adams, Ja. Afhton, Geo. Baron, Henry Bell, J Bickford, Ra. Burton, John Cavill, Tho. Cram, Jof. Dawbney, Ja. Dennington, L. Evans, J. Ewbank, Jof. Garnett, J Hartley, Tho. Hornby, I. Hutherfal, Tho. Leybourn, John Liddell, Tho. Milner, John Mitchell, C. Nichols, Jac. Park, Wm. Pearfon, Wm. Robinfon, Wm. Tarmior, T. Watfon, and Rob. Wilkinfon.
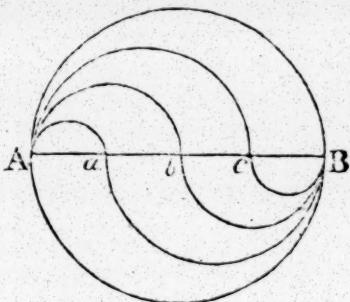
VIII. or PRIZE QUESTION 36, *answered by Mr.* Colin Campbell, *Kendal.*

Let CK and KE reprefent a ray of light coming from the centre C of the bottom of the veffel, to the eye at E, refracted at K by the furface of the water, and touching the edge of the veffel at N; alfo CI perpendicular to the furface; and let K A D be a prolongation of the line I K. paffing through the fide of the veffel in A, and meeting ED a perpendicular from the eye; alfo on KE let KM be equal KC, and ML perpendicular to the horizon. Now from the data !K : KL :: 3 : 4; and if IK be put equal x, then KC $= \sqrt{36 + x^2}$, and K A $= 12 - x$, alfo KL $= \frac{4}{3}x$; hence LM $= \sqrt{36 - \frac{7}{9}x^2}$: Then by fimilar triangles ML : KL :: NA : K A $= \dfrac{8x}{\sqrt{36 - \frac{7}{9}x^2}} = 12 - x$; from which equation is got $x = 4\cdot3769$. Again by fimilar triangles NA : AK :: ED : DK $= 76\,231$; whence AD $= 68\cdot6079$ inches, or $5\cdot7173$ feet, as required.

The fame anfwered by Mr. Olinthus Gregory, *of Taxley.*

Here C being the centre of the bafe, E the place of the eye, and CKE the ray refracted at K. By the queftion AN $=$ CI $= 6$, and IK $+$ KA $=$ IA $= 12$: putting $x =$ fine of KNA angle of refraction, its cofine $\sqrt{1 - x^2} =$ fine of NKA, then $\frac{3}{4}x =$ fine of ICK angle of incidence, and its cofine $\sqrt{1 - \frac{9}{16}x^2} =$ fine of IKC. Hence

$$\sqrt{1 - x^2} : 6 :: x : \frac{6x}{\sqrt{1 - x^2}} = \text{K A, and } \sqrt{1 - \frac{9}{16}x^2} : 6 ::$$

$$\tfrac{3}{4}x : \frac{9x}{2\sqrt{1 - \frac{9}{16}x^2}} = \text{IK ; confeq. } \frac{6x}{\sqrt{1 - x^2}} + \frac{9x}{\sqrt{4 - \frac{9}{4}x^2}} = 12;$$

this equation gives $x = \cdot78587$ &c, which value being fubftituted for x, gives AK $= 7\frac{1}{5}$, and IK $= 4\frac{3}{4}$ nearly. Then, by fimilar triangles, as AN : AK :: DE : DK $= 76\frac{1}{4}$; confeq. DK $-$ AK $= 6\frac{3}{8}$ inches $= 5$ ft. $8\frac{5}{8}$ inches, the diftance from he rim of the veffel.

The fame anfwered by Mr. Tho. Leybourn.

Let G H N O reprefent the cylindrical veffel, AF the furface of the water, CK the incident ray from the centre C, and KE the refracted ray, produced to meet the perpendicular in B. Putting now CI $-$ AN $= 6$ inches $= a$, AI $= 12 = b$, and
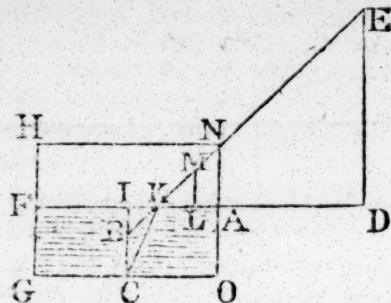
IK $= x$; then CK $= \sqrt{a^2+x^2}$, and KN $= \sqrt{a^2+\overline{b-x}|^2}$; hence, by the queſtion and optics, $4 : 3 :: $ CK : BK $= \frac{3}{4}\sqrt{a^2+x^2}$; and by ſim. triangles KB² : KI² :: KN² : KA², that is in ſpecies $\frac{9}{16} \cdot \overline{a^2+x^2} : x^2 :: \overline{a^2+\overline{b-x}|^2} : \overline{b-x}|^2$; then by multiplying extremes and means $\frac{9}{16} \cdot \overline{a^2+x^2} \cdot \overline{b-x}|^2 = \overline{a^2+\overline{b-x}|^2} \cdot x^2$, which equation reduced gives $x^4 - 24x^3 + 180x^2 + 1110\frac{6}{7}x = 666\frac{4}{7}$; here $x = 4\cdot377$; then by ſimilar triangles NA : AK :: ED : DK $= 76\cdot23$, conſeq. DK $-$ AK $=$ AD $= 68\cdot607$ inches $= 5\cdot717$ feet, the diſtance from the neareſt edge of the veſſel.

The ſame anſwered by Mr. Wm. Pearſon, North Shields.

Let GHNO be the cylindrical veſſel, CK an incident ray from the centre C of the bottom, and KNE the ſame ray refracted in the air to the eye at E. Put IA $= 12 = a$, CI $= 6 = b$, and IK $= x$; then in the triangle CIK, as $b : 1 :: x : \frac{x}{b} = $ tang. of the incident angle ICK, its ſine is $\frac{x}{\sqrt{b^2+x^2}}$; and in the triangle KNA, as $b : 1 :: a-x : \frac{a-x}{b} = $ tang. of refraction angle KNA, its ſine is $\frac{a-x}{\sqrt{b^2+\overline{a-x}|^2}}$.

Then, by optics $3 : 4 :: \frac{x}{\sqrt{b^2+x^2}} : \frac{4x}{3\sqrt{b^2+x^2}} = \frac{a-x}{\sqrt{b^2+\overline{a-x}^2}}$; which equation reduced becomes $x^4 - 24x^3 + 180x^2 + 1110\frac{6}{7}x = 6665\frac{4}{7}$; hence $x = 4\cdot37699$. Then IA $-$ IK $=$ KA $= 7\cdot62301$, and by ſimilar triangles NA : AK :: ED : DK $= 76\cdot2301$; then DK $-$ AK $=$ AD $= 68\cdot60709$ inches, or $5\cdot71725$ feet, the diſtance required.

The ſame anſwered by Mr. Rob. Wilkinſon.

Let GHNO repreſent the veſſel; C the centre of its bottom. Put NO $=$ IA $= 12$ inc. $=$ 1ft. $= a$, CI $=$ AN $= 6 - = \frac{1}{2} - = \frac{1}{2}a$, DE $= 5$ feet above the water; IK $= x$; and per queſt. $4 : 3 ::$ KC : KB.

Then, $\sqrt{CI^2+IK^2}=$ CK $= \sqrt{\frac{1}{4}a^2+x^2}$, theref. BK $= \frac{3}{4}\sqrt{\frac{1}{4}a^2+x^2}$ by ſim. tri. KI : KB :: KA : KN $= \frac{2a-x}{4}\sqrt{\frac{1}{4}a^2+x^2}$, alſo $\sqrt{NA^2+KA^2}=$ KN $= \sqrt{\frac{1}{4}a^2+\overline{a-x}|^2}$ $\frac{2a-x}{4}\sqrt{\frac{1}{4}a^2+x^2}$; this equation reduced gives $x =$ IK $= \cdot364745$; theref. IA $-$ IK $=$ AK $= \cdot635255$; and by ſim. tri. NA : AK :: ED : NA : AD $= 5\cdot717295 =$ the diſtance required.

Other true and ingenious anſwers were given by Meſſrs. Ja. Adams, J. Aſhton, Aſpinal, Job Ayres, Geo. Baron, Ben. Benſon, Wm. Burdon, John Cavill, Ja. Dennington, Rd. Elliott, L. Evans, Joſ. Garnett, J. Jackſon, John Mitchell, Wm. Robinſon, Ra. Simpſon, and T. Watſon.—And, on drawing the lots, the prize of 10 Suppl. ments, for anſwering it, fell to Mr. Colin Campbell of Kendall ; and that for anſwering the Enigmas, Rebuſes, &c, to Mr. Tho. Browne.

Answers to Questions of the laſt Diary.

I. Diary Question 954 anſwered by Mr. Wm. Armſtrong, at Mr. Howard's School, Carliſle.

Put $x =$ the firſt term, and $r =$ the ratio of the progreſſion. Then will x, rx, $r^2 x$ repreſent the required numbers ; and hence $x + r^2 x = 68$, alſo $r^3 x^3 = 4096$; from the laſt, $r x = \sqrt[3]{4096} = 16$ the middle number, and $x = \frac{16}{r}$; this ſubſtituted in the firſt equation gives $\frac{16}{r} + 16 r = 68$, or $\frac{4}{r} + 4 r = 17$; hence $4 r^2 - 17 r = - 4$, and here $r = 4$; which gives 4, 16, 64, for the three numbers ; and therefore Mr. Nield's age is 32, the 16th of Feb.

II. Diary Question 955 anſwered by Mr. John Campbell, of Weſtham.

The queſtion amounts to this ; in what time will 8l. 5s. placed at compound intereſt, together with an annuity of 5s. per quarter, forborn at 1 per cent. per quarter, amount to a given ſum 250l. Put 8l. 5s. or 8·25 $= b$, 5s. or ·25l. $= c$, 250l. $= d$, 1·01 $= r$, and the required number of quarters $= x$; then $b r^x$ is the amount of the ſum b, and $\frac{r^x - 1}{r - 1} c$ the amount of the annuity c ; theref. their ſum $b r^x + \frac{r^x - 1}{r - 1} c = d$.

Put $a = \frac{c}{r - 1}$, ſo ſhall $r^x = \frac{a + d}{a + b}$; put this laſt $= m$, then $x \times$ log. of $r =$ log. of m, and hence $x = \frac{\log. m}{\log. r} = 212·325$ quarters, or 53·081 years, the time of diſcharging the national debt, in a ſimilar manner.

IV. Diary Question 957 anſwered by Mr. George Stevenſon, Howdon.

As the area of the ſpace ABEF *(ſee fig. to the 1ſt ſolu. in the Diary)* is to be equal to the area of the triangle EDG, and the part DEFC being common, conſeq. the area of the triangle FCG will be $=$ the paral. AC ; hence the hypothenuſe and

area are given, to conſtruct the triangle; which reduces the caſe to prob. 33, pag. 345, Simpſon's Algebra, where the conſtruction and calculation are given. The calculation for the angles is, " As the ſquare of the hypothenuſe, is to the area, ſo is radius, to the ſine of double the leſſer of the two acute angles;" whence the $\angle$ FGC $= 36° 52'$; alſo the baſe FC $= 39 = $ BC, and CG $= 52 = 2$CD; conſeq. the hypothenuſe muſt be drawn from B, and CD $=$ DG.

VII. DIARY QUESTION 960 *anſwered by Mr.* Geo. Baron, *South Shields.*

Let P repreſent the pole, T. Thirſk, M. Mal-   *Fig. in the* ton, H. Hovingham, and O the oppoſite point   *Diary.* of the ſpherical triangle T M O, where P H is perp. to TM, and TO perp. to TP; then will PT, PH, PM, repreſent the colatitudes of the three places Thirſk, Hovingham, and Malton. Now in the right-angled ſpherical triangle THP, there are given P H $= 35° 50'$, and T H $= 18$ miles $= 15' 33'' \cdot 12$, to find TP $= 35° 50' 2'' \cdot 829$, and the angle P T H $= 89° 38' 28'' \cdot 12$. And in the right-angled triangle P H M, are given the ſide P H $= 35° 50'$, and ſide H M $= 9$ miles $= 7' 46'' \cdot 56$, to find the ſide P M $= 35° 50' 0'' \cdot 657$. Alſo in the ſpherical triangle TPM, are given the ſide PM as above, the ſide T M $= 27$ miles $= 23' 19'' \cdot 68$, and angle PTM $= 89° 38' 28'' \cdot 12$, to find the angle TPM $= 39' 50'' 46$. And in the right-angled ſpherical triangle P T O, are given angle P $= 39' 50'' \cdot 46$, and the ſide TP $= 35° 50' 2'' \cdot 829$, to find the ſide TO $= 23' 19'' \cdot 73$. Hence comp. TP $= 54° 9' 57'' 171 = $ latitude of Thirſk; comp. PM $= 54° 9' 59'' \cdot 342 = $ latitude of Malton, and comp. $\angle$PTH $= 21' 31'' \cdot 12 = \angle$ M T O. New, as the ſpherical triangle M T O is ſo very ſmall, it may be conſidered as a plane triangle without making any ſenſible error; the ſide T M being 27 miles $= 216000$ links, and the ſide T O $= 23' 19'' \cdot 73 = 216008$ links; hence by Dr. Hutton's Menſur. pa. 67, $\frac{1}{2}$ T M $\times$ T O $\times$ ſin. $\angle$ T $= 146024691$ ſquare links $= 1460$ acres, the area ſought.

VIII. DIARY QUESTION 961 *anſwered by Mr.* Olinthus Gregory, *of Yaxley.*

In this queſtion there are given the latitude $= 52° 5'$ north, the declination $18° 9'$ north, and the altitude of the ſun's centre $= 39° 49' \frac{1}{2}$; from whence, by common ſpherical triangles, I find the time from noon to be 3 h. 9 m. 54 ſec., and the azimuth from the north $114° 14' 15''$, which nearly agrees to the point S. W. by W. $\frac{3}{4}$ W, therefore the bearing of the ſteeple from the ſecond ſtation, is nearly N. E. by E. $\frac{3}{4}$ E.—Then in the plane triangle ABC (*Fig. in the Diary*) are given AB $= 3650$ links, angle A $= 103° 52'$, and angle A $= 114° 14' 15''$—

$47° 48' 45''$ (or $4\frac{1}{4}$ points) $= 66° 25' 30''$, alſo $66° 25'\frac{1}{2} +$ $103° 52' = 170° 17'\frac{1}{2}$, therefore $180° - 170° 17'\frac{1}{2} = 9° 42'\frac{1}{2} =$ $\angle C$; hence by plane trigonometry $BC = 21014$ links $= 2$ miles 1103 yds, the diſtance of the ſteeple from the laſt ſtation.

Alſo, by the Diary for 1792, the ſun's declination on Friday the 11th of May, at noon, was $18° 7'$ north; theref. the given time was May the 11th at 3 h. 9 m. 54 ſec. after noon.

In this ſolution I have ſuppoſed $39° 49'\frac{1}{2}$ to be the true altitude of the ſun's centre; therefore have not made any allowance for ſemi-diameter, refraction, and parallax.

IX. DIARY QUESTION 962 *anſwered by Mr.* C. Brady.

Put $3x =$ the time or number of ſeconds the ſtone was in falling, $g = 16\frac{1}{12}$ feet, the deſcent of gravity, and $a = 1142$ feet, the velocity of ſound in a ſecond; then $x - 1 =$ the time of the ſound's flight to the perſon at the brink of the pit, and $\overline{x-1} \times a =$ the depth. But by the laws of falling bodies $9g x^2 =$ the depth; therefore $9g x^2 = \overline{x-1} \times a$, or $x^2 - \frac{a}{9g} x = -\frac{a}{9g}$; the reſolution of which quadratic equation gives the two roots or values of $x = 6\cdot71447$ and $1\cdot17499$; conſequently the depth $\overline{x-1} \times a$ is $6525\cdot925$ or $199\cdot843$ feet nearly.

X. DIARY QUESTION 963 *anſwered by* A. Buchanan, *Sedgefield.*

Multiply both ſides of the given equation by $x^n y^n$, and it becomes $y^n x^{n-1} \dot{x} + x^n y^{n-1} \dot{y} = \frac{x^{m+n} \dot{x}}{a}$, the fluents of

which give $\frac{x^n y^n}{n} = \frac{x^{m+n+1}}{a(m+n+1)}$, or $ay^n = \frac{n x^{m+1}}{m+n+1}$, which (if no correction by a conſtant quantity be neceſſary) is the relation required.—If $x = 0$, then y is $= 0$, which ſhews that x and y begin together.—This queſtion is the ſame as that at pa. 289, Simpſon's Fluxions, but the ſolution there given is only in a particular caſe; and ſimilar to prob. 47, pag. 485, Emerſon's Miſcel.; or to pag. 170, vol. 3, Hutton's Diarian Miſcellany; all which the ingenious propoſer was perhaps not aware of.—If $n = 1$, then $y = \frac{x^{m+1}}{a(m+2)}$, or $xy = \frac{x^{m+2}}{a(m+2)}$, the ſame as determined by Mr. Simpſon.

XI. Diary Question 964 *anſwered by Mr.* Geo. Stevenſon, *Howdon.*

This queſtion is not new, but has appeared under different forms in ſeveral periodical publications: It was propoſed in verſe in the Palladium for 1777, in Carnan's Diary for 1788, and in No. 1ſt of the Scientific Receptacle for April 1ſt 1791, to which a variety of anſwers was given. The methods of anſwering it by means of finding expreſſions for the areas of the two ſegments algebraically, or by fluxions, are very tedious, and produce equations almoſt intolerable to reduce in a direct manner; but the following, by means of Trial-and-Error, ſeems as ſimple as can be expected.—The method is this: Join CD (*fig. to the ſolu. in the Diary*), by the principles of Geom. as $AC : CD :: CD : CE$, and hence $FE = CF - CE$. Now ſuppoſe C D as near as poſſible; whence find the verſed ſines CE and EF, and then, by means of a table of circular ſegments, the area of the two ſemi-ſegments CDE and FDE; and find how much their ſum differs from the given quantity. Again, ſuppoſe another value of CD, and repeat the ſame operation; then, by Trial-and-Error, approximate to the value of CD the required radius.

XIII. Diary Question 966 *anſwered by Mr.* Ja. Nicholſon, *Teacher of Mathematics, Newcaſtle.*

Let A C be the required plane. Produce D A ſo that $AN = BC$, and on AN deſcribe the ſemi-circle AON cutting AC in O; draw POI perp. to AN, in which take $OI = OP$, ſo ſhall I be the vertex of the parabolic curve IAE, of which the part AE is deſcribed by the heavy body after running down the tangent CA, and quitting it at A. Put $AB = a$, $AD = c$, and $BC = x$; then $AC = \sqrt{a^2 + x^2} =$ ſuppoſe z for the preſent; now, by ſim. triangles, $AC : BC :: AN = BC : AO = \frac{x^2}{z}$ $:: AO : AP = HI = \frac{x^3}{z^2}$; and $AC : AB :: AO : PO = \frac{ax^2}{z^2}$ $= OI$, $AH = \frac{2ax^2}{z^2}$; then by the nature of the parabola, $\sqrt{IH} : \sqrt{IK} :: HA : KE$. or $\sqrt{IH} : \sqrt{IK} - \sqrt{IH} :: HA$ $: DE = \frac{2ax^3}{z^2} \times \frac{\sqrt{a^3 + c^2} - \sqrt{x^3}}{\sqrt{x^3}} = \frac{2ax^2}{z^2} \times$
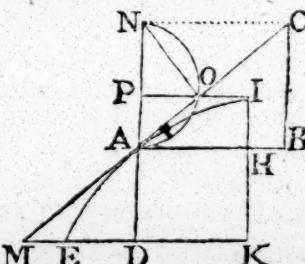
$$\frac{\sqrt{x^4+cxz^2}-x^2}{x^2}=\frac{2a}{z^2}\times\frac{cxz^2}{\sqrt{x^4+cxz^2}+x^2}=\frac{2acx}{\sqrt{x^4+cxz^2}+x^2}$$

= (reftoring the value of z^2) $\dfrac{2acx}{\sqrt{x^4+cx^3+ca^2x+x^2}}$ a maxi-

mum; its fluxion being put $=$ o, by reduction gives $x^4-\dfrac{8a^2}{c}x^3-2a^2x^2+a^4=$ o. Hence, when $a=3$, and $c=9$,
we have $BC=x=1.687$, $AC=3.4419$, $DE=5.502$,
and $\angle BAC = 29^\circ\ 21'\ 15''$.

Among the many anfwers received to this problem, fome were given upon erroneous principles: fuch were thofe which make the velocity at A a maximum, or the angle at A a max. or the product of the velocity and fine of that angle a max. or the fine of the double angle a maximum.

XIV. DIARY QUESTION 967 *anfwered by* Mr. Jof. Garnett.

Let CB be a pofition of the hypothenufe;
draw AD perp. to CB, and from D demit
DE perp. to AB, the curve being ADG
IA. Put $a=$ CB, $x=$ AE, and $y=$
DE; then $\sqrt{x^2+y^2}=$ AD, and by fim.
triangles AD : AE :: BC : AC, and AD :
DE :: BC : AB, which give $AC=\dfrac{ax}{\sqrt{x^2+y^2}}$, and $AB=$
$\dfrac{ay}{\sqrt{x^2+y^2}}$; but $AC\times AB=BC\times AD$, that is $\dfrac{a^2xy}{x^2+y^2}=$
$a\sqrt{x^2+y^2}$, hence $axy=\overline{x^2+y^2}\,^{\frac{3}{2}}$ the equation of the curve.
And as it is equally affected with x and y, the curve will re-
turn into itfelf, and will have its convex and concave parts ex-
actly fimilar.

To find the area: put $vy=x$; then the equation will be-
come $avy^2=\overline{v^2y^2+y^2}\,^{\frac{3}{2}}$, hence $y=\dfrac{av}{1+v^2\,|^{\frac{3}{2}}}$, and $x=$
$\dfrac{av^2}{1+v^2\,|^{\frac{3}{2}}}$; confeq. $\dot{x}=\dfrac{2av-av^3}{1+v^2\,|^{\frac{1}{2}}}\dot{v}$, and the fluxion of the

area $y\dot{x}=\dfrac{2a^2v^2-a^2v^4}{1+v^2\,|^4}\dot{v}$, the fluent of which is $\dfrac{a^2}{48}\times$:

$\dfrac{24v^3}{1+v^2\,|^3}+\dfrac{6v^3}{1+v^2\,|^2}+\dfrac{3v^3}{1+v^2}-3v+3\times.017453\times$ deg.

in the arch whofe tangent is equal v, and radius equal 1,
which needs no correction.

Bifect the angle CAB with AG equal half the hypothenufe,
and demit GF perp. to AB; then will AG divide the curve into
two equal parts, and $AF = FG$.—But when the abfciffa and
ordinate are equal, $v=1$, therefore $\dfrac{1.7854}{16}a^2=$ area of
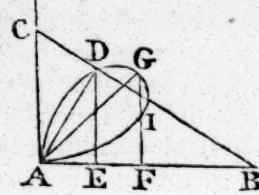
ADGFA; conſeq. $\frac{1\cdot7854}{16}a^2 - \frac{1}{18}a^2$ ($\triangle$ AFG) $= \frac{\cdot7854}{16}a^2$

$=$ area of ADGA, or $\frac{\cdot7854}{8} =$ the area of ADGIA, the whole

curve, $=$ twice the area of a circle whoſe diameter is $\frac{1}{4}a$.

NEW QUESTIONS.

I. Question 37, *by Mr.* Wm. Pearſon, *North Shields.*

To the Editor.—Sir, When I have got a few boys well grounded in Arithmitic, Practical Geometry, Menſuration, &c, I then make it a rule to give out a problem monthly, which they are to reſolve at their vacant hours during that time; which I find anſwers the purpoſe very well; for it both diſcovers their different geniuſes, and makes them endeavour to excel each other; which greatly advances their education, as well as improves their talents. The following problem is for the month of June 1793.

Prob. The height, breadth, and length, of my ſchool room, are in proportion to each other as 2, 3, and 4, reſpectively; and the length of the longeſt ſtraight line that can be drawn in it, is 26·9258 feet. Required the dimenſions of the ſaid room, by calculation, and by geometrical conſtruction?

II. Question 38, *by Mr.* Geo. Baron, *South Shields.*

At Simonbourn, in Northumberland, there is a field in the form of an obtuſe-angled triangle: its leaſt ſide meaſures 806 links; and on the baſe or longeſt ſide grow three large beach trees. The tree next the leaſt ſide is 384 links from the middlemoſt one, and the tree next the other ſide is 426 links from the ſaid middlemoſt. Now, a line drawn from the tree next the leaſt ſide to the obtuſe angle, is perpendicular to the other ſide; a line drawn from the middle tree to the ſaid angle, is perpendicular to the baſe; and a line drawn from the other tree to the ſame angle, is perpendicular to the leaſt ſide. Required the area of the field.

III. Question 39, *by Mr.* James Aſhton, *Harrington.*

A gentleman wants a leaden pipe, of 9 feet long, to weigh juſt $60\frac{4}{5}$ pounds averdupois, and the thickneſs of the lead to be preciſely $\frac{1}{6}$th of the diameter of the hollow part. Required both that diameter and the thickneſs of lead.

IV. Question 40, *by Miſs* N. Maſon, *of Clapham, Yorkſh.*

A plumb or weight of 20 pounds, hung at 30 inches diſtance from the fulcrum of a ſteel-yard, will counterpoſe a caſk of red wine, ſuſpended at 2 inches from the fulcrum on the other ſide; required how many gallons of wine the caſk contains, ſuppoſing the weight of wood in it to be 40 pounds.

V. Question 41, *by Mr.* Edw. Warren.

Sir William Hamilton, in his letters on Volcanos, says, that from the summit of Mount Ætna, the eye takes in, at one view, a circle of 900 English miles square. Query, Whether this will not give the height of the mountain considerably different from what it is generally supposed to be?

VI. Question 42, *by* Oculus Mundi.

Query the point, in a direct line between the earth and moon, where the quantity of surface seen of those two bodies is the greatest possible, and what that quantity is; supposing their two diameters to be 7958 and 2170 miles, and the mean distance of their centres 60 of the earth's semi-diameters.

VII. Question 43, *by Mr.* Thomas Leybourn.

Two seamen have between them made prize of an ingot of pure gold, in the form of the segment of a sphere, the diameter of the base being 12 inches, and the versed sine or perpendicular height 5 inches; now this prize is to be equally divided between them, by a section parallel to the base; it is therefore proposed to find where the section must be made, and the value of each man's share, at 4l. sterling the ounce.

VIII, *or* Prize Question 44, *by Mr.* John Rodham, *Richmond, Yorkshire.* [*Whoever answers it before Candlemas-Day, has a chance by lot for* 10 *Supplements.*]

Some Mathematicians finding a frustum of a cone lying upon its side, on a horizontal plane, they pushed it with such force as made it run round, just to the place where it first lay; now the diameters of its ends being 5 feet and 3 feet, they observed that it had rolled over the least number of square yards possible under the above circumstances. Query the said number of square yards?

F I N I S.

nat
ne
er
if-

nd
cs
ng
an

of
e-
r-
ly
is
d

n,

on
ce
w
d
e
of